THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
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Statuary and Art Bronzes

A Description of the Work of One of the Oldest Bronze Foundries, Jno. Williams, Inc., New York

One of the most interesting plants in New York is the architectural and statuary bronze foundry of Jno. Williams, Inc., at 556 West 27th street. This company was first organized in 1875 and has recently celebrated its 51st anniversary.

The main business of the company is the casting and finishing of bronze statuary, architectural work and tablets. The plant includes the following departments:

Foundry, Molding, Melting, Pattern, Chasing Fitting, Finishing, Brazing, Coloring, Lacquering.

These are the direct production departments. There are, of course, accessory departments, such as drafting and designing.

FOUNDRY METHODS

French sand is used almost entirely throughout the foundry. The metal is melted in pit fire crucible furnaces and moved from these furnaces to the molds by the usual monorail hoists. Every casting is, of course, a different problem and as most of the work of this foundry consists of specialties of which only one casting is made, no general rules for molding practice can apply. In the case of large castings, the metal is poured into a large basin above the mold. This basin is made of iron frames lined with molding sand and fire clay. It is large enough to hold all the metal required for the particular job. The basin has a hole in the bottom in which an iron plug covered with sand and fire clay has been fitted. A long handle is fastened to the end of the plug and extends beyond the top of the basin. When the basin is full, the plug is pulled out and the metal enters the mold through a number of feeding channels which lead to all parts of the mold, thus feeding all sections at the same time.

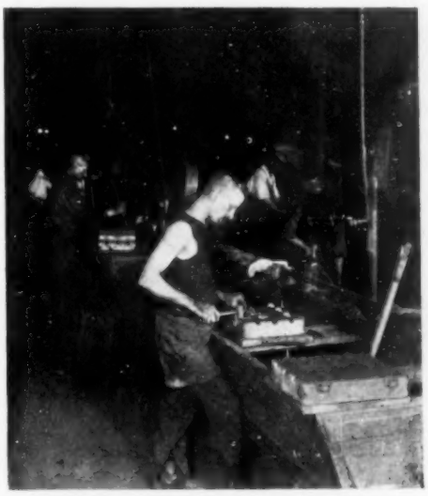


FIG. 2—TUB MOULDERS AT WORK ON SMALL ARTICLES

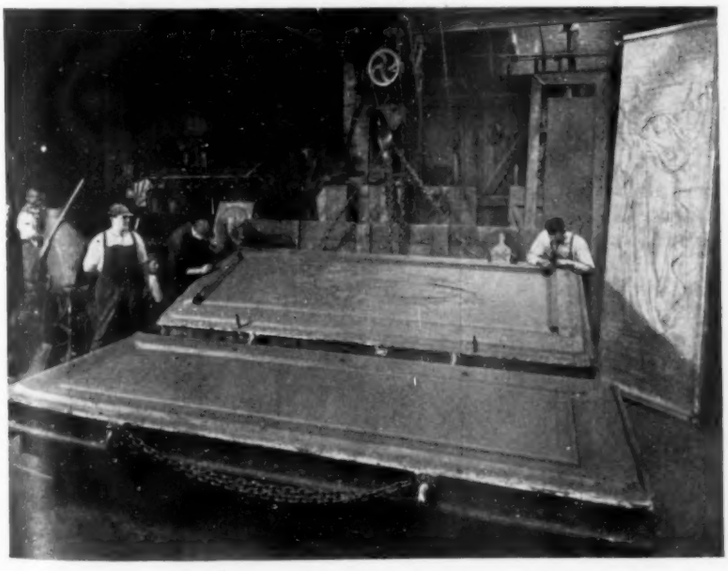


FIG. 1—SHOWING PREPARATION OF MOULD IN WHICH WAS CAST ONE HALF OF THE DOOR FOR THE CENTRAL PORTAL OF THE BOSTON PUBLIC LIBRARY

CASTING STATUARY

Of special interest is the method of casting bronze statuary. The illustrations, chart 1 and chart 2 show the principles of the method of casting a bust figure.

The plaster model "B" in chart 1 is a portrait bust. It will be completely surrounded by separate blocks of sand or cores (D on charts Nos. 1 and 2). A description of the charts follows:

"A" shown in charts Nos. 1 and 2 are the iron frames or flasks. "B" shown in chart No. 1 is

the sculptor's plaster model. "C" shown in chart No. 2 are the vents in the mold for the escape of gases generated by contact of molten metal with the sand. "D" shown in charts 1 and 2 are the separate blocks of molding sand or cores. They have been packed one by one around the model. They are removed from the model in the reverse order in which they were made, then dried in an oven and reassembled, but of course, the plaster model has been removed from the mold. There is now a complete matrix in which the inner sand core is supported by iron bars (see "F" chart No. 2).

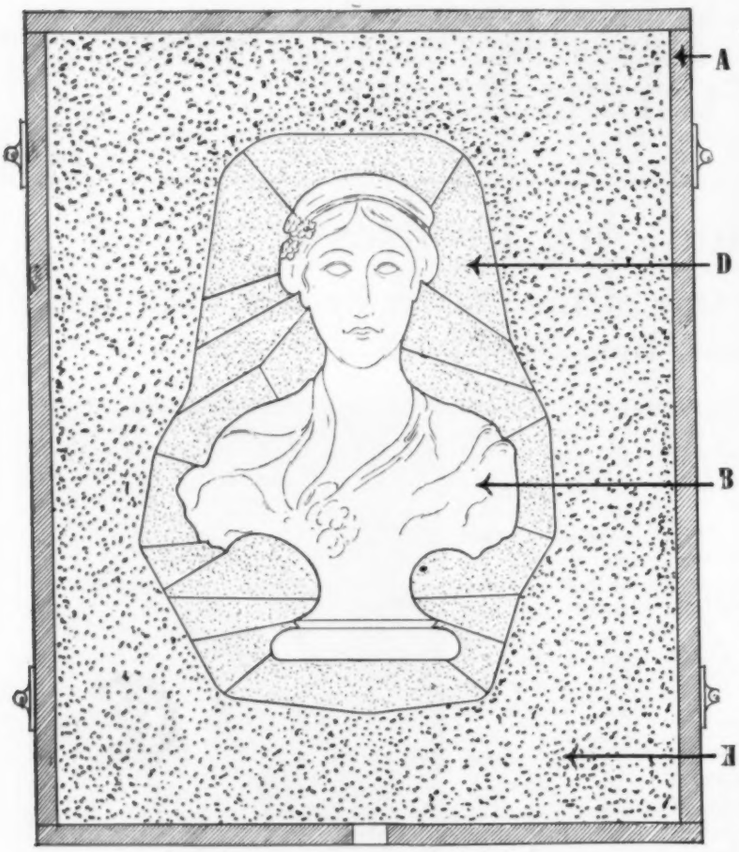


CHART 1: "A"—IRON FRAMES CALLED "FLASKS." "B"—Sculptor's plaster model of a portrait bust. "D"—Separate blocks of moulding sand called "cores." They have been packed one by one around the model. "H"—Outer sand backing or outer envelope of the mould.

The inner sand core ("E" in chart No. 2) is suspended in the mold by the iron bars "F." The space between the inner sand core and the mold when filled with molten bronze (see "I" in chart No. 2) forms the bronze casting. This bronze casting now surrounds the inner sand core which is afterward dug out—and by this method the hollow bronze casting is obtained.

The feeding channels through which the molten metal is carried to all parts of the mold are also shown (see "G" in chart No. 2).

"H" shown in charts 1 and 2 indicates the outer backing or outer envelope of the mold. This is composed of a cheaper, coarser sand than the French sand used for the cores.

After the casting has cooled and has been removed from the sand, it is acid dipped to clean it from the heat discoloration. It is then taken by chasers and filers who remove fins, burrs, gates, etc. If the statue is made in a number of different parts it is then sent to a fitting department where it is joined by a bolt, screw or brazing.

Indoor work can be protected with lacquer, but work exposed to the weather is left to assume the natural patina or oxidized finish. However, statues are not sent out in the simple, acid-dipped condition as the appearance of the new metal would be too glaring. They are first oxidized chemically by any one of a number of well-known methods and then left to deepen in tone.

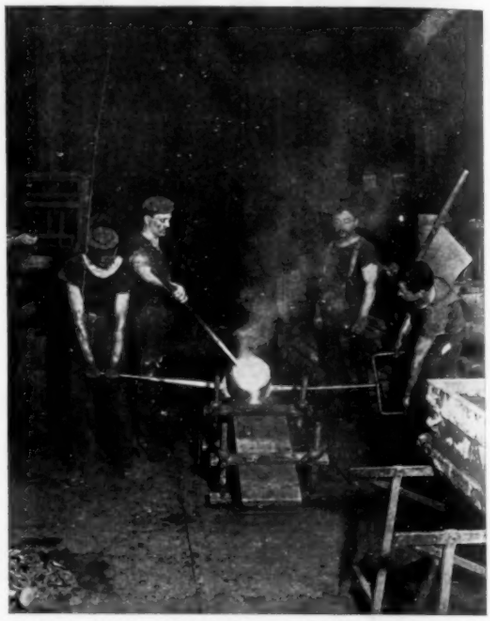


FIG. 3—VIEW SHOWING FOUNDRYMEN POURING BRONZE IN SMALL MOULDS.

BURIAL CASKETS

An unusual type of casting is made by this company, namely bronze coffins. These are cast all in one piece, except, of course, for the lid. As a result the finished product consists of four sides and a bottom. The difficulty of making this casting can be realized as the coffin is usually about 8 ft. long, 2 ft. 4 in. wide, 2 ft. deep, and the wall thickness only about ⅜ inch. The method of casting is the same as described above, namely the overhead basin method, and no difficulty is experienced

FIG. 4—VIEW SHOWING MEN AT WORK ON LARGE MOULDS.

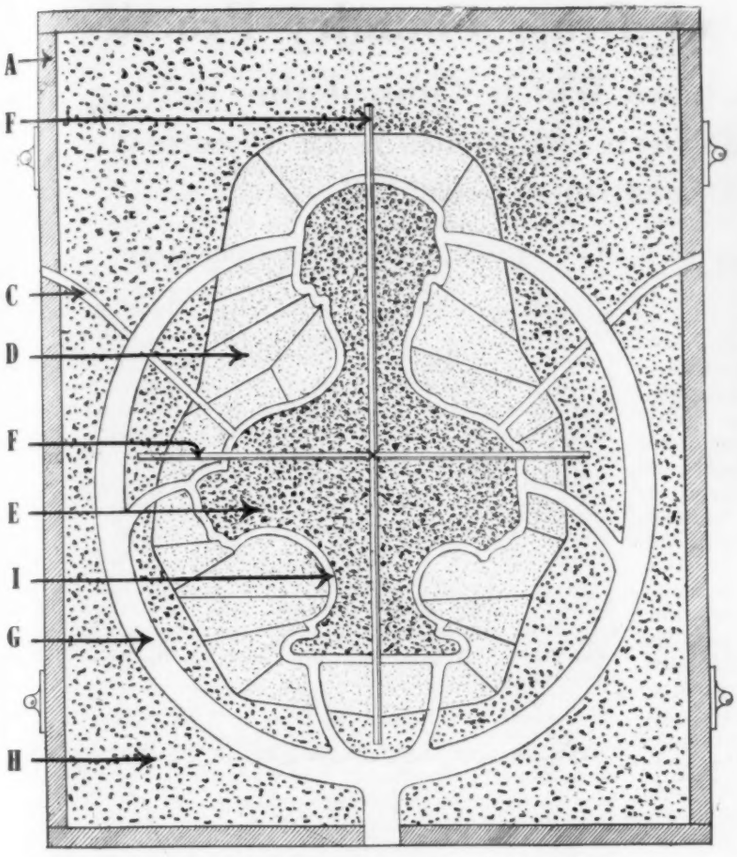


CHART 2: "A"—IRON FRAMES CALLED "FLASKS." "C"—Vents in mould for the escape of gases generated by contact of molten metal with the sand. "D"—Separate blocks of moulding sand called "cores." They have been packed one by one around the model. "E"—Inner sand core. "F"—Iron bars which support the inner sand core "E." "G"—Feeding channels through which the molten metal is carried to all parts of the mould. "H"—Outer sand backing or outer envelope of the mould. "I"—Space between inner sand core and the mould when filled with molten bronze forms the bronze cast.

in turning out these coffins without rejections. The coffins are subsequently acid dipped, chased and finished in accordance with specifications.

SPECIAL TABLETS

An interesting example of the tablet work done by this foundry is the tablet made for the new library in Athens, Greece, presented by Joannes Gennadius, for many years minister from Greece to Washington and London. This library will form a part of the American School of Classical Studies in Athens. The Carnegie Foundation supplied the funds for the building to house this library and the Greek government presented the land. The tablet is an excellent example of some of the best work done by the Jno. Williams foundry.

FIG. 5—VIEW SHOWING MEN AT WORK ON MOULDS FOR LARGE GRILLES.

FIG. 6—VIEW SHOWING METHOD OF JOINING BRONZE BY BRAZING

The outstanding features of the work done in this plant are the high degree of craftsmanship necessary and the fact that it is carried on in a manner peculiar to the best traditions of the industry. Due to the special nature of the jobs and the fact that they are seldom duplicated, production methods do not obtain, but rather the careful and painstaking methods of the artisan.

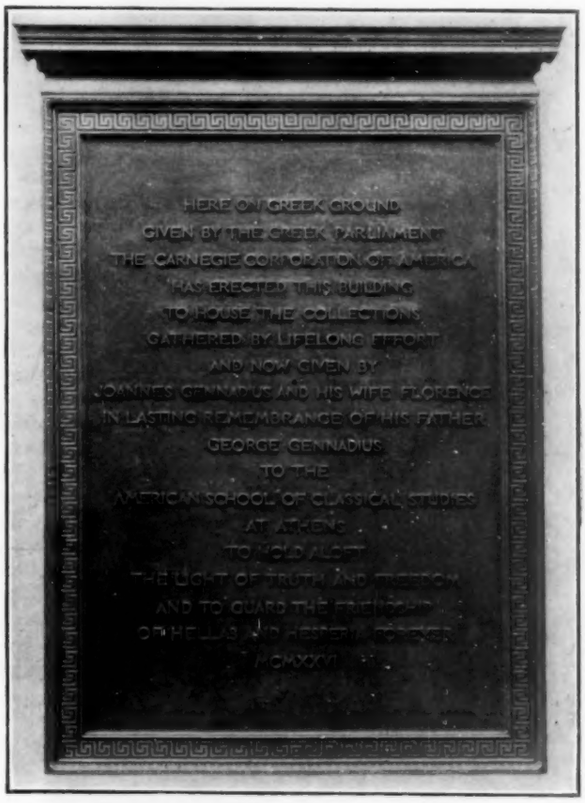

HERE ON GREEK GROUND
GIVEN BY THE GREEK PARLIAMENT
THE CARNEGIE CORPORATION OF AMERICA
HAS ERECTED THIS BUILDING
TO HOUSE THE COLLECTIONS
GATHERED BY LIFELONG EFFORT
AND NOW GIVEN BY
JOANNES GENNADIUS AND HIS WIFE FLORENCE
IN LASTING REMEMBRANCE OF HIS FATHER
GEORGE GENNADIUS
TO THE
AMERICAN SCHOOL OF CLASSICAL STUDIES
AT ATHENS
TO HOLD ALOFT
THE LIGHT OF TRUTH AND FREEDOM

FIG. 7—BRONZE TABLET FOR NEW LIBRARY IN ATHENS, GREECE

The Fundamentals of Brass Foundry Practice

A Description of the Basic Laws Which Control the Melting and Casting of Metals and Their Application to Practical Foundry Operations*—Part 2

Written for The Metal Industry by R. R. CLARKE, Foundry Superintendent

PREVENTING WARPED CASTINGS

In making any casting, different physical forces are always at work or at hand; partly for good, partly for evil. To arrange these forces, either with or against each other, in favor of the casting is the basis of molding. This point can be easily illustrated. To run a large, thin, flat plate, metal must be driven rapidly into the mold. A sprue of ample height, well-filled in pouring, furnishes this driving power. But the same sprue, at the finish of pouring, applies high pressure suddenly and strains the mold. To relieve the mold of this shock we place a riser of equal or less height at some distant point in the mold. Then the liquid metal, obeying the law as it ascends this riser, gradually checks its speed and the metal loses its "smashing" effect. By graduating the height of this riser in order to escape high static pressure, the pouring sprue and its driving power can be raised to almost any limit. The metal then will simply overflow the riser at the optional height and reduce the static pressure to that predetermined by this height. In making long thin strips, poured at the one end only, with a single gate, this method proved its worth by producing the casting without warping it, whereas multiple gates attached to the side of the casting had always warped it before. This example illustrates the many possibilities of nullifying effects by neutralizing causes, to compel the same physical forces to work against themselves or each other. Similarly, these forces can be made to act in concert.

PREVENTING CORE-BLOWS

Take another example. Metal enveloping a dry core generates gases in the core. These gases follow lines of least resistance which ought to be through the pores of the core, to the vents of the core, to the mold continuation of these vents, on to the atmosphere and freedom. So long as these avenues remain lines of least resistance leading **away** from the casting, the gases cannot strike **toward** the casting. But when for any reason new lines of least resistance open up **toward** the casting, then the gases strike that way and we get a core-blow. This condition arises when the core is insufficiently dried, when it is too hard, too close or compact, too rich in bond or in volatile matter, when the core surface is glazed, when the vents are too small, too circuitous, too few in number, or when they become plugged or in any way disconnected, or terminate too far from some body of core beyond; when the metal around the core is thin or the metal is of low specific gravity as aluminum, etc.

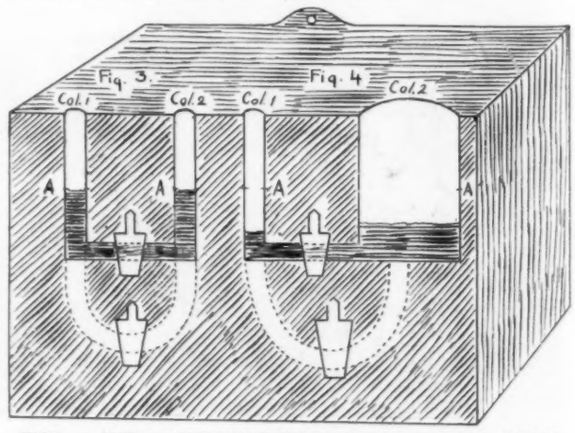
Perhaps the body of a core is sometimes too large for the prints, making it difficult to draw a vent large enough through the prints freely to exhaust the body gases. Sometimes, too, these gases generate so rapidly and in such volume that the resistance of the atmosphere becomes the over-balancing factor against their free and unhampered exit. That is why we light core vents, to increase the expansibility of the gases and lower the atmospheric resistance in the pathway. The effect is plain at the instant any vent is lighted. The gases roll out lazily until ignited, when they fairly leap away in their own flame. Making a fire from oil-soaked waste under the vent opening, and before starting to pour the mold, is a further aid in that the gases ignite immediately and a partial vacuum exists from the very beginning of pouring. Artificial suction is another resource in extreme cases. We have made castings where, to escape a core-blow, we inserted a copper pipe into the vent and led it to the atmosphere. As the gases generated we had a man literally "smoke" them out as he would smoke his pipe of tobacco. In the larger classes of work different mechanical means can be devised to create the suction. The principles involved, of course, are those of the vacuum and the expansibility of gases.

LAWS OF PHYSICS APPLIED TO THE FOUNDRY

We are now ready to consider, in detail and from a strict foundry standpoint, a few of the primary physical forces, conditions and causes and their laws and principles applying to foundry practice. In so doing the aim will be to treat these subjects as exclusively foundry property, though they are by no means so narrowly confined. They are, of course, universal in scope and apply wherever matter exists.

HYDROSTATICS

The first at hand are the Hydrostatic Principles which are simply the principles that govern liquids when at rest or under confinement. These principles are of special importance to the foundry in that they control liquid metal pressures in the mold. They are primary considerations in the running and mis-running of castings, the swelling and shrinking of castings, the full and sharp mold-line and mold surface impressions of castings, the feeding of castings, the physical solidity of metal in castings, etc. Every mold, in pouring and at the very finish of pouring, is dominated by these principles. They are three in number and will be pointed out by illustration.



FIGS. 3 AND 4, SHOWING HOW LIQUID METAL SEEKS ITS OWN LEVEL

*All rights reserved. This series will be collected and published in book form. Part 1 was published in our issue of July, 1926.

Fig. 3 represents a mold of two vertical bars 1⅛ inches in diameter × 12 inches long and bottom-connected by a horizontal bar 6 inches long × 1⅛ inches diameter. The mold, of course, is set perfectly level. Now if we place a stop cock at the middle point of the horizontal opening and fill the vertical Column 1 with perfectly fluid metal, the metal will flow down to the stop cock and no further. If we open the cock slightly, the metal will cross over gently and rise to point a^1 in Column 2 which is its middle point and exactly the same level as point a in Column 1. If we open the valve quickly and wide, the metal will rush across rapidly, rise to a point above point A^1 in Column 2, see-saw up and down in the two columns and finally come to rest at the same middle point A-A^1, in the two columns.

If, instead of a straight connecting channel, we use one of U or horn shape, as per dotted line, and open the cock quickly and wide, then the metal will spout up Column 2 faster and to a still higher point, but with the same see-saw motion, and come to rest exactly as before. These actions seem perfectly rational; equal dimensions in the two columns give equal volumes and weights of metal, which reduces the matter to a mere balancing of these weights.

Now, if we increase Column 2 to any diameter as in Fig. 4, and repeat the operations, then, while details such as rate of rising, commotion in rising, distance of rising, etc., will change, still the metal in both columns will come to rest at the same common level. If we fill Column 2, of far greater volume than Column 1, the metal will cross over and rise more rapidly in Column 1, but still come to rest at exactly the same levels, which in this case will be the middle points A-A^1 of the volumes.

This illustrates the first of the Hydrostatic Principles namely: **Liquid Metal Columns In All Connected Parts of the Mold Seek Common Levels and Come to Rest in the Same Horizontal Plane.**

If a quantity of fluid metal is placed in an indestructible cylinder and a non-leaking piston inserted, then no amount of pressure on that piston will move the piston to any great degree. If the pressure is maintained until the metal starts to congeal, the piston will move to compress the congealing metal from the plastic to the solid state, and so continue until the resistance of the solidified metal equals the pressure applied. This exemplifies the second principle, namely: **Liquid Metal Is Practically Incompressible, But Loses This Property As It Returns To Its Solid State.**

If a mold of a flat disc 20 inches in diameter and 1 inch thick is gated to a sprue 28 inches high and poured to the top level of the sprue with fluid metal of a specific gravity of 8 (8 times heavier than water), the liquid pressure per square inch on the cope of the mold will be, for practical purposes, 8 pounds, on the side walls 8 pounds plus, and on the bottom side, 8.35 pounds. The total pressures on these surfaces will be 2,512 pounds, 503 pounds plus, and 26.22 pounds, respectively, making a sum total of 5,637 pounds on the mold. The diameter of the sprue used is purposely omitted because that makes no difference; whether it be one inch, ten inches or anything at all, the pressure generated by 28 inches height will be the same. This constitutes what is known as the Hydrostatic Paradox, the thing apparently false yet true, namely: **Liquid Columns of the Same Height Exert Equal Pressures, Independent of Their Volumes.**

Analysis makes the matter clear. A four-inch-square sprue, 28 inches high holds 128 pounds of metal (specific gravity = 8), and that is the pressure exerted. But the four-inch-square sprue has an end area or surface of 16 square inches and this 128 pounds applies to every 16 square inches of surface so that the pressure per square inch of surface would equal 128 ÷ 16 or 8, the very same thing to which the one inch square sprue figures. It might be further remarked that regardless of the size, shape or length of the connecting gate between the sprue and the casting, the pressure will not vary so long as the metal remains perfectly liquid. The principle, re-stated for special application to moulding practice is: Liquid metal columns (sprues, risers, etc.) exert pressures in proportion to their heights and independent of their volumes, and transmit these pressures undiminished in all directions throughout the mold.

It might be here noted that liquids transmit shock as well as pressure, and the less disturbance there is to the metal in the gates and mold, the better will be the casting. The effect, throughout the mold, of metal coming up a riser against a cold or wet weight is a well known example.

Metal pressures vary, of course, with the fluidity and with the specific gravity of the metal. The calculations above presuppose perfectly fluid metal. Few, if any, molds are ever poured with metal in this perfect condition and calculations cannot be expected to hold absolutely throughout; they will naturally vary with conditions.

CALCULATING METAL PRESSURES

A good rule for finding the unit of metal pressure at any point in the mold, accurate enough for practical purposes, is to multiply the height of the sprue above that point by the specific gravity of the metal and divide by 28. The formula is:

$$\frac{\text{Height} \times \text{Specific Gravity}}{28} = \text{Pressure in lbs. per sq. in.}$$

To illustrate, if the top of the pouring sprue is 10 inches above the point in question and the specific gravity of the metal is 6, then the pressure per square inch is 6 × 10 ÷ 28 = 2 1/7 pounds. The rule is derived from the weight of pure water which is practically 1,000 ounces per cubic foot, or 1,728 cubic inches. A column of water 28 inches high containing 28 cubic inches therefore weighs one pound, which is its pressure per square inch at that height. Metal pressure is merely water pressure multiplied by the specific gravity of the metal.

POURING PRESSURE DESIRABLE

As stated above, all imperfectly liquid metal is slightly compressible, and under high sprue pressure it will run a casting much more full and compact than if deprived that pressure. A low cope or pouring sprue, or a sprue cut short in pouring is one of the greatest menaces to a casting, while a high cope or pouring sprue well-filled is always a strong and active influence in its favor. High sprue pressure will force the metal into the highest and furthest points of the mold, hold and compress it firmly there and prevent the sickly and shrunken appearance so often in evidence where pouring sprues are too short.

Figure 5 will illustrate this. It shows a chunky casting, poured through a high sprue of only ⅜ inch diameter, connected by a gate of the same size. The casting is of variable

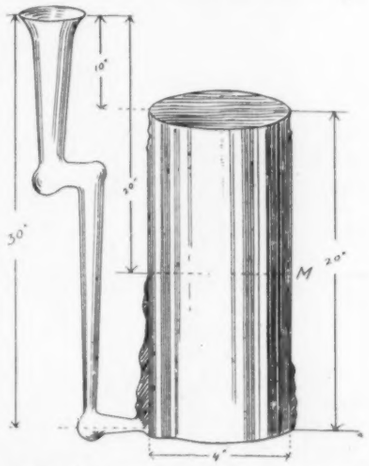


FIG. 5. GATING A SOLID CASTING

bulk, one of the type difficult to make solid. Yet upon machining and testing it was found to be solid and compact throughout. In chunky work and in work of variable bulk, so signally important in pressure that it can be stated on the authority of physical law and corroborated by experience, that if you want sickly looking and shrunken castings, make them under low copes and pouring sprues.

REPRESENTATIVE FOUNDRY EXAMPLES

To illustrate the Hydrostatic Principles as applied to every day experience two examples are submitted. One is a four-inch diameter pin, 20 inches long, molded and poured vertically; the other, a flat plate, 42 inches square and one inch thick. (See figures 5 and 6.) In the vertical pin mold the height from sprue top to bottom of pin is 30 inches; to the middle point of the pin, 20 inches; to the top of the pin, 10 inches. Using 8 as the specific gravity of the metal, the unit pressure per square inch at each point is 8 4/7 lbs., 5 5/7 lbs. and 2 6/7 lbs., respectively. Areas are: top surface, 12.56 square inches; bottom surface, 12.56; circumference of wall, 12.56 square inches. The total pressure on the bottom surface is about 108 pounds. At the middle point this vertical wall pressure is about 72 pounds. At the top surface the total pressure is only 36 pounds on the vertical wall and the cope surface alike. The high bottom pressure will strain the pin at that point and the illustration is perfectly representative of many castings of depth so molded.

With this in mind we can arrive at the following correct practice for green-sand molding such castings. Use sand of good body but not too close of grain, thoroughly and uniformly tempered and riddled on the floor. The flask must be rigid and unyielding. Fill the flask to a depth of 6 inches and pien-ram rigidly up to 1 inch of the pattern; butt-ram hard and within ¼ inch of the pattern. Scratch the parting made by the butt-ram with fingers to restore the bond with the next 6 inch filling. Continue thus up to within 6 inches of the top, then gradually ease off on the ramming reducing to about average around the top. Use a cope of ample height and gate and pour at the bottom, breaking the gate at least twice to avoid too high a drop of metal. Use talc or plumbago to face the mold, especially around the bottom. Attach a riser or feeding gate at the cope. (This will be discussed further on.) Pour from the bottom until the metal gets in to the riser, then pause, plug the pouring sprue and fill the riser up with live metal. The metal should be quite hot while pouring. Clamp or weight the mold according to the cope surface, as will appear in illustrations following.

The metal in being poured in to the mold steps to the bottom, enters the mold, rises with a slight upward boiling tendency which works impurities to the metal surface, and enters the riser at a temperature fairly uniform with that of the mold throughout. The pause before filling up the riser with hotter metal gives the metal already in the riser, as well as that in the top of the casting, a chance to take up part of the shrinking and the hotter metal filled in penetrates and feeds all the better. If the mold were

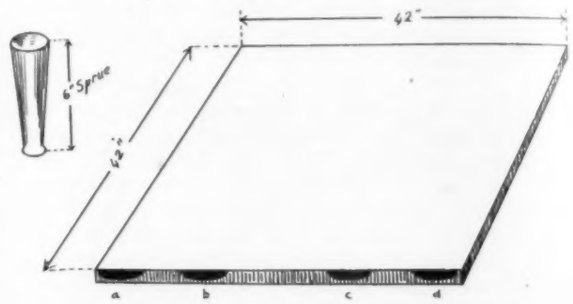


FIG. 6. FLAT PLATE CASTING

gated at the top the drop would be 20 inches over the side walls and down. This would cut and tear the side walls, dig into the bottom surface and produce a commotion in the metal, tending to entrap impurities rather than expel them. In all molds of depth this bottom method of gating is in accordance with physical law and plain common sense.

Figure 6 shows a 42 inch square plate, 1 inch thick, multiple gated at points a, b, c and d, and covered by a cope 6 inches high. If this mold be poured to the top level of a sprue with metal of 8 specific gravity, the pressure will be 1-5/7 pounds per square inch and the total pressure on the cope surface will be 3,024 pounds. Now, that pressure is a lifting pressure on the cope as well as a downward pressure on the drag. To avoid a strain or a run-out we must, in molding, reckon seriously with this lifting power. Rigid flasks, clamped securely, amply weighted down, and barred up closely and securely, are the means at hand. A perfectly level flat plate, placed over the cope and clamped down with it, is the surest method, if a plate of this size is available. Using a riser gate to relieve the mold as previously described is a wise precaution.

This series will be continued in an early issue.—Ed.

Melting Ferro-Chromium

Written for The Metal Industry by JESSE L. JONES, Metallurgical Editor

Q.—What shall I use for melting "Flint Alloy" in 100 lb. batches up to 3,000 deg. F., with gas? What flux would you use? We are counting on a double shell preheated air furnace, stationary.

A.—The sample of Flint Alloy was found to be ferro-chromium. It contained, roughly:

	Per Cent
Chromium	12½
Silicon	½
Carbon	3
Remainder—Iron	83

To melt such a material in 100 lb. lots, so that it will be sufficiently fluid to pour a small casting like the sample, would require at least 3,000 deg. F. It ought to be possible to do the melting in regular steel melting crucibles, such as are used in crucible steel foundry practice. It is not usually customary to use fluxes in crucible steel melting although in the case of alloy steel melting some melters use about 1 per cent of crushed red fire brick along with the mixture. This flux melts a little in advance of the steel mixture and forms a cover or seal that prevents oxidation and gives a better product.

The sample submitted seemed to have been poured into a permanent mold of some type, and gave evidence of having been poured at a high temperature, as the fins on the casting gave every evidence of very fluid metal having been used.

The alloy seemed very resistant to all acids, except hydrochloric and dissolved but slowly in this acid. It would therefore, seem that this alloy might be suitable for acid-resisting castings provided the acid were other than hydrochloric.

The Ford Brass Foundries

Metal Foundries Operated by the Ford Motor Company in Highland Park, Mich.

Written for The Metal Industry by ROBERT M. POLHAMUS, Detroit, Mich.

More than 1,250,000 pounds of brass, copper and other non-ferrous metals will have been used during 1926 by the Highland Park brass foundry at the Ford Motor Company in manufacturing special castings for the Detroit, Toledo & Ironton Railroad, which is owned and operated by Henry Ford. During 1925 the plant consumed 960,836 pounds of these metals in casting locomotive and freight car parts for the railroad.

The foundry turns out side rod bushings, main rod butt end bushings, valve rod bushings, middle connection side rod bushings, large castings designed to be cut into rings forming floating liners for eccentric straps, locomotive bell castings, and numerous smaller bushings.

FIG. 1. COMPLETED PRODUCTS OF THE FORD MOTOR COMPANY'S BRASS FOUNDRY THAT WILL BE USED ON HENRY FORD'S DETROIT, TOLEDO & IRONTON RAILROAD

The smallest castings made last year for the D. T. & I. were brass nuts to be nickel plated, which weighed a fraction of a pound each, while the largest castings weighed more than 240 pounds each.

Crucibles having a capacity of 500 pounds of metal each are used for pouring the smaller castings, and the larger castings are poured from oil-fired furnaces with capacity of 1,400 pounds each.

The foundry now produces all locomotive brasses, journals and bearings by the chill cast process as a result of a series of experiments which indicated that iron molds could be successfully adapted to replace sand molds and produce a superior product, insuring a homogeneous metal free from sand holes. Very little cleaning is required from such die castings, as compared with those made with sand molds, and a long life is assured.

D. T. & I. bushing requirements call for a wide variety of compositions, according to the conditions of usage. Rod bushings contain 83 per cent of copper, 11 per cent of tin, six per cent of lead, and one-quarter of one per cent of phosphorus. Test bars are taken from each pouring and from these careful trials are made to determine the properties of the metal; anything even slightly defective is of course rejected and recast.

The following system is employed to inspect castings: The charge is made up of a mixture of virgin metals and back stock, the latter being composed of scrap car journals, sprues and gates from those cast before. The charge is carefully weighed and checked, and charged into a hot furnace in such a manner that the entire bath will be melted at approximately the same time. White metals are added and stirred vigorously. Experience has taught that brass cannot be agitated too much, and after what is considered sufficient stirring a sample is taken, cooled and broken. The fracture shows the quality of the metal in the furnace. Temperature readings are taken and when correct, the molds are poured. There may be as many as six ladles to each furnace, and to insure uniform metal for each casting the bath is stirred between ladles.

D. T. & I. engine numbers and name plates, the initials worked into a monogram and enclosed within a circle, are all made of cast brass and exact the utmost in molder's skill for their making.

The casting of locomotive bells is another particularly delicate operation, as an incorrect analysis would result in a bell with a tone not in keeping with that of those in use. Locomotive bells for the D. T. & I. are composed of 82 per cent copper and 18 per cent tin, with a trace of phosphorus. The pouring temperature is 1,950 degrees Fahrenheit. In the molding of the bells it is essential that the thickness of the walls be uniform, as this is a large factor in determining the life of a bell. The weight as cast is about 150 pounds, but after machining and polishing they weigh about 90 pounds.

The foundry is at present turning out thousands of small castings used in the D. T. & I. electrification project for hanging the catenary system. These fittings are non-corrosive, being composed of aluminum bronze, a mixture of 90 per cent copper and 10 per cent aluminum. They have a tensile strength of approximately 90,000 pounds per square inch.

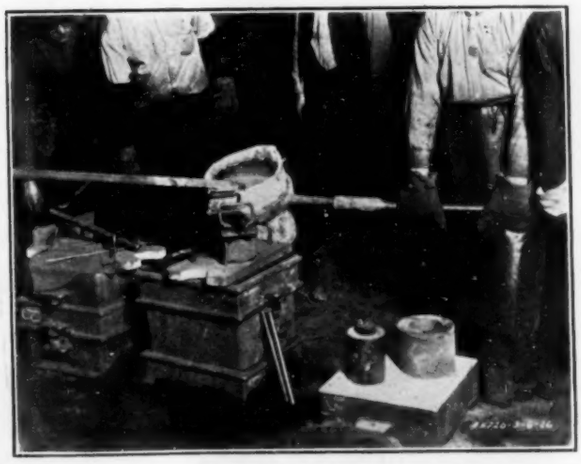


FIG. 2. POURING A SMALL CASTING

After cooling, the castings are inspected for accuracy and sand blasted to loosen all foreign particles. They are then ready for machining in the company's locomotive erecting shops in Fordson, where they are put into service or sent to the various D. T. & I. roundhouses for replacements.

Ships of Silver

"The harder it blew, more swiftly she flew
Through wave and boiling sea
Her timbers strong, defied every storm—
And sailed on merrily."

Written for the Metal Industry by A. F. SAUNDERS, Designer Benedict Mfg. Co., East Syracuse, N. Y.

The present day vogue for ships' models has aroused widespread interest in all things pertaining to the sea. This is not surprising as there are few objects more picturesquely fascinating than old fashioned sailing ships. What thrilling tales of mystery and bold adventure are brought to mind at the sight of a ship. The inherent grace of line in the hull, the forest of rigging and spread of snowy canvas, silhouetted in sharp contrast against the sky, forms a picture that holds the eye by an irresistible attraction. The wholesome sensations of wonder, awe and admiration, and the memories of not a few threads of romance, too, are called forth in just as vivid reality by the little model as by the full-sized craft that actually "goes down to the sea."

Models of ships have been made since the early days of Rome's maritime greatness. They have been made of various kinds of materials, wood, bone, metal and to serve a useful as well as ornamental purpose. The earliest models were used as sailors' votive offerings and as such hung high in the air before the altars and shrines of the seaport towns and fishing villages of the Northern countries.

Practically every kind of craft that ever sailed the seven seas has been faithfully represented in the models of one period or another. From the Viking ship of the ancient Norsemen, the picturesque high pooped Galleon and caravel of the days of Pizzarro, the broad bottomed lumbering square rigger of the English East India Company, Chinese Junks, Ships of the Line, trim Yankee Packets and Clipper ships, reminders of the golden days of '49, to the most modern of sailing and motor yachts.

As long ago as the middle ages the precious metals have played their part in this interesting field of artistic craftsmanship. The first silver ships were used for religious purposes, simple boat-shaped vessels in which the incense was kept for the altar and called a "Navette," meaning "ship" in French. From this early ecclesiastical vessel developed the elaborate table ornament called a "Nef" (ship) made originally to hold spices and sweetmeats, as well as the knife, spoon and napkin of the nobleman. At first the "Nef" was a miniature of a commercial craft usually with one mast as shown in Fig. 1, but during the 16th century models of naval vessels became the style and we find this type the most frequently seen in collections. They usually have two or more masts with fighting tops, sails set and lofty castellated poop and forecastle, such picturesque vessels as Raleigh, Drake, Cortez, Pizzarro and other freebooters used in their search for adventure and plunder.

The best goldsmiths of the time were employed in the making of these elaborate ships' models and many of them show the most exquisite craftsmanship in their making. Antique "Nefs" are very scarce. In fact there are but few to be seen even in the foremost museums of the world.

One of the finest examples of the early type of "Nef" forms a part of the silver treasure of the Basilica of St. Anthony of Padua, Italy, Fig. 1. This beautiful work of art dates from the middle fifteenth century and is particularly interesting as one of the very few "Nefs" used for religious purposes. It is made of solid silver, richly embellished with gold and enamel work. The model is that of a single masted trading vessel of the period. A unique and picturesque feature of this little ship is the high canopied poop and forecastle, both decorated with the most exquisite chasing. The hull is supported by a partly submerged figure of Neptune flanked by two plunging dolphins.

Fig. 2 pictures a very fine old "Nef" of 17th century German make. This silver model is a faithful reproduction of a medieval galley. The hull is elaborately embellished with figures of old Neptune and Naiads in repoussé. The three-storied cabin topped by a tower situated between the main and mizzen masts is a peculiar feature of this work of art. The rudder is handsomely

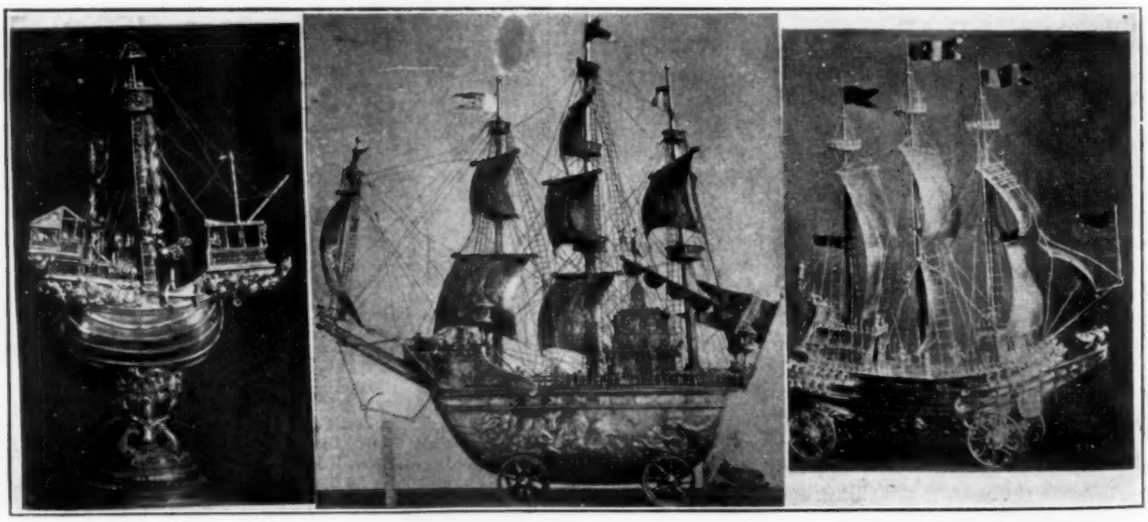


FIG. 1. OLD ITALIAN "NEF." FIG. 2. 17TH CENTURY "NEF." GERMAN FIG. 3. MODERN "NEF."

chased in the form of a dolphin and the funny arrangement of mast and lookout top with its little spritsail at the end of her bowsprit, must have taxed the seamanship of those olden day salts, to carry safely this strange little mast through a stiff blow. The ship is mounted on four wheels that it may be moved about the table easily.

One of the few rare old "Nefs" in this country is owned by Bowdoin College, Brunswick, Maine. This odd little ship is also mounted on four wheels, to permit its being easily propelled about the table, and it is designed to serve as a container for wine. The deck and everything above it is removable, making the entire hull available for any liquor, which is discharged, after passing through a strainer through an opening in the bow. The hull of the ship is handsomely chased in repoussé work, representing, on the starboard side, a figure of the sea god "Neptune" reclining with dolphins. On the port side a recumbent nude figure, presumably that of the goddess Aphrodite with dolphins. A winged Gryphon carrying an anchor in its mouth supports the overhanging bow, the rudder projecting from the stern in the old time fashion is elaborately decorated in chased scroll work. Several sailors climb the shrouds supporting the two masts, and other members of the crew are engaged in various duties about the deck. The flying jib displays the figure of a Gryphon with a crown above, probably the armorial bearings of its original owner. The hall marks upon this rare old antique indicate that it is of early eighteenth century workmanship.

Figure 3 illustrates one of the finest silver "Nefs" of modern craftsmanship. This magnificent piece was presented a few years ago to Commander Peary by the Royal Scottish Geographical Society of Edinburgh. It is a faithful model of a vessel such as was used by Hendrik Hudson, William Baffin and John Davis, three famous arctic explorers of olden times. It is mounted on wheels, all sails and set and the crew at their various stations present a very lifelike appearance.

In recent years several of the most important yachting trophies have been made in the form of silver ships. Could one conceive anything more appropriate or beautiful for the purpose? The newly made Dodge Memorial Trophy presented to the American Power Boat Association as a trophy for speed boats is the latest example. Both experts on ships' models and on silversmithing concede this to be the most perfect model ever made in the precious metals. The trophy made of Sterling silver and valued at $15,000 measures about 42 inches in extreme height and about 43 inches in length. A wooden model was first made by a model expert and from this the silversmith produced its exact counterpart in metal. This little ship is an absolutely correct representation of "Santa Maria," the famous flagship of Columbus.

Figure 5 pictures a yachting trophy of solid silver in the form of a caravel, made some years ago for the Brooklyn Yacht Club as a prize for the boat making the best run from New York to Marblehead. The writer of this article had the pleasure of modeling and supervising the making of this little ship. In design the trophy is an exact reproduction of the large bronze ship on the memorial to the late Robert Louis Stevenson in the City of San Francisco. There is more than mere close imitation in the detail, action and speed being depicted in the sails filled out by the wind and in the way the keel seems to plough through the water. Every detail of mast, spar and sail is carried out in an artistic manner. The figurehead is a representation of "Minerva" the goddess of art and industry, fashioned according to the sailors' ideal. At the stern is an old fashioned double- storied cabin of the kind in which the bold adventurers of the fifteenth century took comfort as they sailed the Spanish main.

Figure 6, another fine example of the American silversmithing incorporating the ship model idea is the unique solid silver "Nef" presented several years ago to the New York Athletic Club by that famous yachtsman, Sir Thomas Lipton. This handsome trophy is a very artistic reproduction of an ancient Norse Viking ship under full sail, just such a ship as Lief the Lucky sailed across the storm tossed Northern seas over nine hundred years ago. The long graceful hull of this picturesque craft suggests some fabulous sea monster, the bow and stern terminating in its head and tail. The wind filled sails and the animated figure of a winged sea horse upon which the ship rests, unmistakably convey the idea of life and movement. Every detail, both of structure and rigging is worked out in the most correct manner. The ship stands almost thirty-six inches in height, not including the wood base upon which the trophy rests.

For accuracy of detail and thoroughness in craftsmanship, it is doubtful if any ship's model in metal, at least made in modern times, can surpass the beautiful reproduction in silver of the historic "Mayflower," presented to the late Walter Hines Page, Ambassador to Great Britain, by the City Council of Plymouth, England, Fig. 4. This trim little ship under full sail faithfully represents the picturesque Dutch type of deep water ship that sailed the

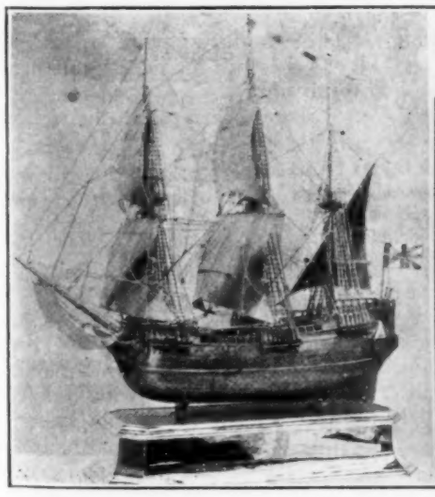


FIG. 4. THE MAYFLOWER IN SILVER

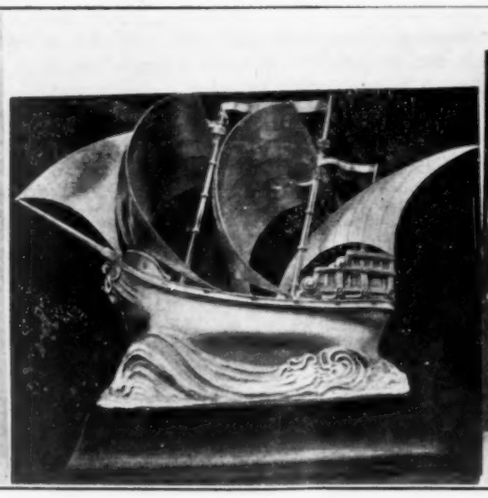


FIG. 5. A CARAVEL

FIG. 6. VIKING SHIP

broad Atlantic at the beginning of the 17th century. Every detail of hull and rigging is most accurately carried out and to those unacquainted with the development of the sailing ship, the "Mayflower" may seem a rather curious looking craft with its strange retention and combination of a lateen sail with the square rig. Also the little sprit-sail, below the bowsprit, with holes in each corner to allow the water caught by the sail, as the ship plunged to escape, instead of splitting it. The curious little hexagonal-shaped lookout towers projecting from either side of the hull near the stern are also a quaintly picturesque feature of this olden time craft. The ship rests on a beautifully made silver casket of simple design. The whole piece is an exceptionally fine example of modern craftsmanship in metal.

Perhaps the most modern of models in silver is the beautifully made replica in miniature of a high powered motor cruiser plunging through the waves which serves as a cover for the handsome "Scripps Cup," made several years ago as a trophy for power boat races on the Great Lakes. The model is perfect in detail and the whipping pennants and vigorougly modeled water convey very cleverly the impression of great speed. While such models of power craft are worthy examples of painstaking craftsmanship and the closest attention to accuracy of detail, nevertheless they lack wholly the artistically picturesque and fascinating interest that draws us to the models of old time sailing ships, vivid reminders of the days of "iron men and wooden ships," a time when this great country was mistress of the sea.

FIG. 7. DODGE MEMORIAL TROPHY

Brass Solutions

Written for The Metal Industry by PAUL KRAMARCIK, Foreman Plater

I have traveled a good deal, from state to state to gain knowledge and experience, but am beginning to consider settling down. Often I have had in mind writing about troubles as I have found them in plating, polishing and buffing departments, not always the fault of the foreman plater. Often the management is to blame for them, as you will notice in some of the questions asked. But I hope that in the future the manufacturers will look into it and put a stop to it as some of the conditions I have found in plants are criminal.

When I took the position with one concern, I expected to have a hard case on hand, the same as I found when making a change to other places. But this had me going the first day, I could not concentrate my mind on one trouble alone, as it was the first of December and the contracts had to be closed. It meant production with a crippled department, like running a race with one leg. After a while I found out that there was no metal in the brass solution which stood at 181 Baume—some gravity! Someone had a lot of carbonate of soda to throw away because it was cheap and the solution was also very low in sodium cyanide. The only deposit I got was directly from the anodes as I have no way of making a titration in this plant.

The first thing I did was to add bisulphite of soda and then cyanide, but that was the time I got a pale deposit. After watching it for awhile and manipulating the current, I then found, by watching the anodes that I had no metal. If I raised the current, the anodes became black; if lowered, they became bright at once. I ran off about one-third of the solution, added water, heated some of the solution and used it for dissolving cyanide of copper and zinc; 4 parts cyanide of copper and 1 part zinc to the gallon, then added enough cyanide to clean it. It has been working very nicely ever since, but for the first four weeks I made an addition of 2 pounds of copper and 10 ounces of zinc every week. I leave it to the men all day long, except only look at the work as it is taken out, as it has to stand a good buffing.

Now speaking about bisulphite of soda, it is a very good conductor, but is apt to change the color very easily. Caustic soda will keep anodes in good shape but Rochelle salts I have always found excellent for a conductor. It will keep the anodes in good shape, and I have never found it, so far, to cause the color to change. I just put some in four days ago to dissolve the basic zinc on the anodes.

Seven years ago I came across a brass solution in New England, which had a sediment of four inches of undissolved metal in the bottom of the tank. By careful additions of sodium cyanide and bisulphite of sodium, I worked it all out and ran the tank for twenty-nine months without adding any metal to it.

For the past two years I have used the following formula for brass:

3½ ozs. cyanide of copper per gallon
1 oz. cyanide of zinc
¼ oz. soda ash
1 oz. Rochelle salts 5¼ ozs. sodium cyanide.

The use of Rochelle salts eliminates the need for ammonia. Two years ago I received a call in Chicago from a small concern to find out the trouble in a nickel solution. It was a double salt solution, specific gravity, 8½, but the solution contained only one-half ounce of metal per gallon. The man in charge was hired with best references; credentials were O. K., but he did not know how to account for it. My present concern had about seven foremen platers in the past two years, and everyone put a little something in, but they did not know why they put it in. If you asked them, they would say that their book said so.

Separating Turnings Saves $20,000 a Year

By the use of a magnetic device for separating iron and steel from Monel turnings when mixed, the General Electric plant at Schenectady was able to save approximately $20,000 annually in the disposal of its scrap.

Approximately 70 gross tons of mixed metal turnings were scrapped each year, as no method was known of separating the high-value Monel from the lower-value iron and steel. Mixed metal turnings were sold for an average price of $15 per gross ton, while clean Monel metal turnings brought approximately $300 per gross ton.

Many methods had been tried of separating the two kinds of scrap without success, including the use of magnetism. The magnetic method was not successful because the Monel metal was also picked up by the magnet. Finally, by using a rheostat on the magnetic separator and reducing the current to a minimum, a point was reached where the iron and steel were picked up and the Monel metal dropped.

During the cold weather a clean separation was difficult because of oil congealing on the turnings and holding the two metals together. One of the plant workmen suggested that the turnings be dried on large steel plates with fires beneath. This was tried and found to be very successful.

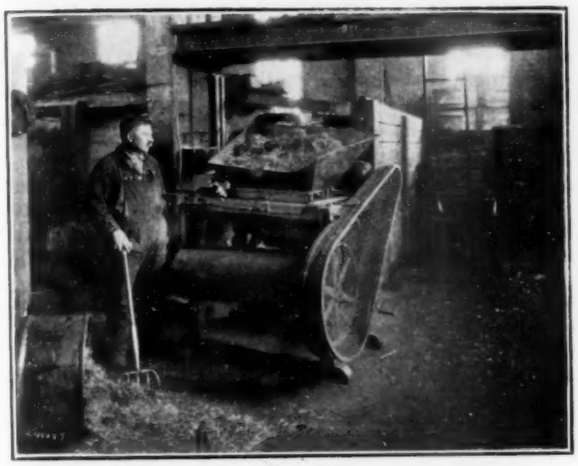


FIG. 1. SEPARATOR IN ACTION

FIG. 2. OIL EXTRACTION

Polishing and Machining Monel Metal Castings

Q.—Would you give us some information on polishing and machining Monel castings. We are making large quantities of bath and basin faucets and small angle valves for pressure work. What are the speeds for polishing wheels; also cutting speed for tools? We have had poor success using same tools as we use on our regular line of brass goods. We have trouble with our taps and dies as we have to cut up to a square shoulder and tools break off. We have best success by flooding with lard oil as a lubricant.

A.—The machining of Monel calls for a somewhat different speed and feed than other metals. An average speed of 60 ft. per minute with a ⅛ in. cut and 1/32 in. feed should be used for turning castings. Monel metal may be drilled at reasonable speed and feed with either carbon steel or high-speed drills; preferably high speed. From a number of tests it has been determined that apparently no advantage is gained by departure from the standard twist-drill cutting and clearance angles as furnished by the majority of large drill manufacturers. For reaming a slow speed, 10 to 15 ft. per minute, and use reamers with spiral flutes.

One of the chief difficulties in tapping is the tendency of the tough chip metal to stick or wedge in the flutes of the taps or chaser. Use taps designed with shallow flutes so as to obtain additional strength. A lip should be ground back to the cutting edges on taps and chasers in order that the chip may curl better through the flutes and clear itself. When tapping completely through the metal it is good practice to grind the taps with a chamber of three to five threads; the same applies to chasers.

In cutting or tapping to a shoulder you will have to use two sets of chasers and taps to get results. The best all round cutting speed for tapping lies between 15 and 20 ft. per minute. The work should be flooded with a lubricant; it protects the tools and all tools should be made of the best obtainable grade of high speed tool speed.—P. W. BLAIR.

Alloys of Silver and Tin

In connection with an investigation of dental amalgams the constitution of the alloys of silver and tin has been determined from the freezing point down to ordinary temperatures. Based mainly on the results of heating and cooling curves and microscopic examination of heat-treated specimens, an equilibrium diagram has been constructed. The compound Ag_3Sn, which is the fundamental constituent in the filings used for amalgamation in dental fillings, has been examined in further detail by means of determinations of electrical resistance at different temperatures, thermal expansion and X-ray examination.

Experiments with pure tin and alloys of tin containing silver have shown that the presence of 0.2 per cent of silver prevents the transformation from white to gray tin, even when in contact with gray tin. A. J. MURPHY*

* Abstract of a paper read before the meeting of the British Institute of Metals, March 10-11, 1926.

An Efficient Electro-Plating Department

How the Bridgeport Brass Company Manages Its Plating Plant

Written for The Metal Industry by F. A. WESTBROOK, Electrical Engineer

The electro-plating department of the Bridgeport Brass Company, of Bridgeport, Conn., has two distinctive features. One of these is the fact that it has most unusually good atmospheric conditions, and the other is that very close and friendly cooperation has been achieved between it and the Research, or Technical, Department.

FIG. 3—VIEWS OF PLATING TANKS SHOWING SPACE DEPARTMENT SHOWING A UNIT CONSISTING OF A CONTINUOUS PLATING TANK, THE WASHING TANK AND THE CONTINUOUS DRYER IN THE LEFT BACKGROUND

The latter is a very valuable accomplishment, of great practical significance. For instance, the member of the technical staff who is the specialist on plating makes it a practice to spend considerable time in this department

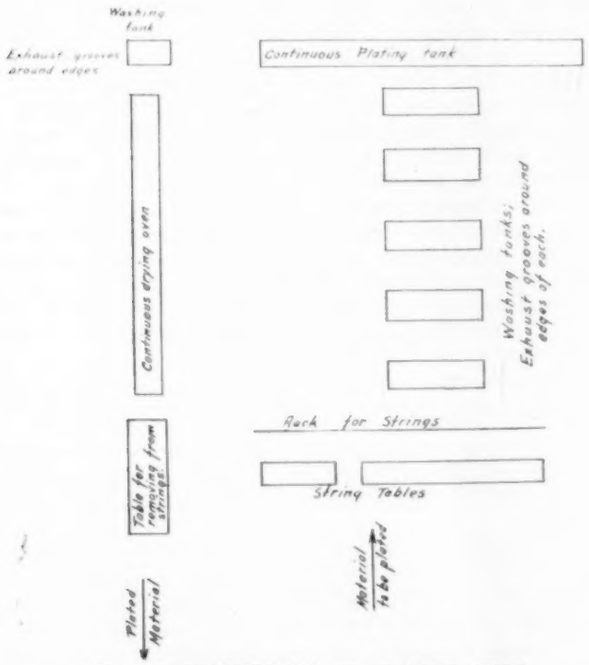


FIG. 2—ARRANGEMENT OF PLATING UNIT

to watch the work as it goes on. If anything does not appear to be progressing just as it should be he speaks to the operator about it instead of going to the foreman with a complaint. If the matter is of a more general nature he takes it up with the foreman rather than with some superintendent or the works manager, as this procedure would place the foreman in an unfavorable light. In this way the technical department can exercise a sort of unofficial supervision, which it is easy enough to make official whenever necessary, and it makes possible a degree of mutually helpful cooperation by which the company is bound to profit.

REJECTIONS CUT DOWN

The results of this are shown in numerous economies. By checking up on the amount of plating on any article as the process goes on, it is possible greatly to reduce the amount of rejections. An interesting instance of this occurred in connection with the nickel plating of hub caps for Buick automobiles. It so happened that the racks on which these caps are placed in the solution hold three rows and it was found that those in the middle, completely sur-

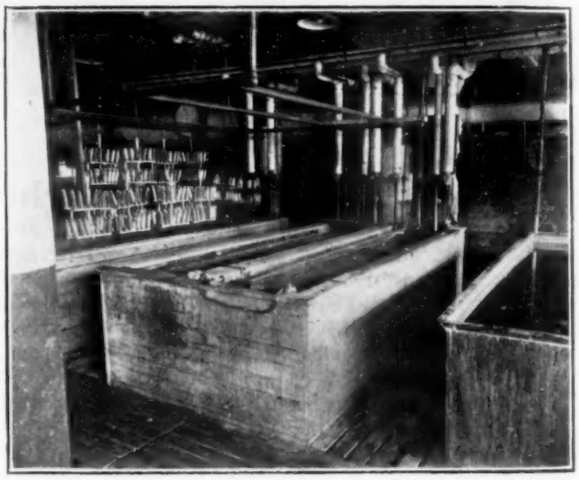


FIG. 3—DETAIL OF PLATING TANKS SHOWING SPACE AROUND THE EDGES THROUGH WHICH THE FUMES ARE DRAWN OFF

rounded by others, received less deposit than those around the outside. A very simple remedy was soon found which merely consisted of arranging the inner caps so that they projected out a little beyond the others. In other cases, the position which the parts to be plated are placed in makes an important difference in the quality of the work. The foreman of the Plating Department does not hesitate to call in the technical man whenever anything goes wrong or if he is suspicious that something might not be just right.

LABOR COSTS CUT

One very important and ingenious arrangement was worked out by which much labor was saved and production increased. This consisted of having each continuous plating tank placed as a unit with its washing tanks and continuous dryer, and so arranged that the raw material enters and the finished product leaves very nearly at the same point. This is shown on the attached diagram and also in one of the illustrations.

VENTILATION

The method of ventilation is unusual, if not unique. Instead of permitting the steam from the washing tanks to go into the room and then taking it off by hoods or other intakes near the ceiling, it is drawn into exhaust grooves around the edges of each tank. As a consequence very little of it ever gets into the atmosphere and the air in this department differs very little from that in other parts of the plant. The suction amounts to about one inch of water.

Analysis of Plating Solutions

Approved Methods for Analyzing Nickel, Copper, Zinc, Brass, Silver and Gold Solutions. Conclusion. From the Monthly Review, March, 1926*

By OLIVER J. SIZELOVE

Newark Branch, American Electro-Platers' Society

SILVER SOLUTION

Standardizing NH CNS—Ammonium Sulpho-Cyanide

Take 22 gms. NH_4CNS, dissolved in water and make to 1 Litre. Weigh .5 gms. pure silver, place in 250 cc beaker, dissolve with 5 cc, C.P. HNO_3, and a few drops of water. Dilute to 200 cc and add a few drops of a 10% solution $(NH_4)\ Fe\ (SO_4)_2$ (Iron-ammonium sulphate) and titrate with NH_4CNS until a faint red color appears.

Calculations:

Number of cc NH_4CNS used divided into .5=factor for NH_4CNS.

Example:

16.1 cc NH_4CNS used.
.5÷16.1=.031. Therefore each cc of Standard NH_4CNS=.031 gms. silver.

METAL CONTENT

Take 10 cc of silver plating solution, dilute to 50 cc with water Heat gently and add enough ammonium sulphide to precipitate the silver. Digest, filter and wash.

Place the filter paper containing the p.p. in a 250 cc beaker, add 5 cc HNO_3 and boil to expel NO_2 fumes. Dilute to 200 cc, add a few drops $(NH_4)\ Fe\ (SO_4)_2$ and titrate with NH_4CNS until a faint red color appears. The number of cc of NH_4CNS used x factor x 12.2=oz. Silver (Troy) per gallon solution.

Example:

9 cc NH_4CNS used.
9x.031x12.2=3.40 oz. (Troy) silver per gallon.

DETERMINING FREE CYANIDE

Take 10 cc plating solution, place in 150 cc beaker, dilute to 100 cc with water, add a few drops of 10% solution K.I. and titrate with N/10 $AGNO_3$ until faint cloud appears.

The number of cc used x factor for $AgNO_3$x13.3=oz. free cyanide per gallon of solution.

Example:

26 cc $AgNO_3$ used.
26x.0105x13.3=3.63 oz. free cyanide per gallon.

GOLD SOLUTIONS

N/100 Iodine 1.27 gms. Iodine, 2.5 gms. KI to 1 Litre.
No/100 $Na_2S_2O_3$, 2.48 gms. 1 litre.

Standardizing

Weigh accurately .1 gm. fine gold and dissolve in a 250 cc beaker with aqua regia, evaporate to dryness, dilute to 150 cc and add enough 10% solution KI until the gold precipitated as aurous iodide is completely dissolved. Starch solution is then added, and the amount of N/100 $Na_2S_2O_3$ required to decolorize the liquid noted. From this amount is deducted the amount of N/100 iodine required to just produce a perceptible rose tint in the liquid.

Calculations:

Subtract the number cc of iodine used from the number of cc $Na_2S_2O_3$ used, and divide the weight of the gold taken by the remainder.

Example:

106.1 cc of $Na_2S_2O_3$ used.
3 cc of iodine used.
106.1—3=103.1 corrected amount of $Na_2S_2O_3$
.1÷103.1=.00097
∴ each cc of N/100 $Na_2S_2O_3$=.00097 gms. gold

METAL CONTENT OF CYANIDE GOLD SOLUTION

Take 10 cc of the solution in a 250 cc beaker, add enough HCL to destroy the cyanide and convert the gold to a tri-chloride of gold solution. Evaporate to dryness, dilute to 150 cc, add an excess of 10% KI solution, and a few drops of starch solution which produces a dirty green color.

Titrate with N/100 $Na_2S_2O_3$ until the solution is decolorized and then titrate back with the N/100 iodine solution until rose tint appears.

Calculations:

Number of cc $Na_2S_2O_3$ used minus the number of cc iodine used x factor x 12.2=oz. of gold (Troy) per gallon oz. of goldx20=pwt. per gallons.

Free Cyanide Content

Take 10 cc of solution, dilute to 100 cc, add a few drops of a 10% solution KI, and titrate with N/10 $AgNO_3$ until a faint cloudiness appears.

Calculations:

Number of cc of Ag NO_3 used, x factor for Ag NO_3x13.3 equals oz. of free Na CN per gallon solution.

METAL CONTENT

Salt Water Gold and Yellow Prussiate Immersion Gold Solutions.

Take 10 cc of solution, add 10 cc c.p. HCL to destroy the cyanide and evaporate. Dilute to 150 cc, add 10 cc of a 10% solution ferous sulphate (Fe_2SO_4. 7 H_2O). The solution is allowed to stand for several hours, when the gold will be precipitated as metallic gold. Precipitate is filtered, washed and transferred to a 250 cc beaker.

Dissolve precipitate in aqua regia, evaporate to dryness, dilute to 150 cc and add enough 10% solution KI until the gold precipitated as aurous iodide is completely dissolved. Starch solution is then added, and the amount of N/100 $Na_2S_2O_3$ required to decolorize the liquid noted. From this amount is deducted the amount of N/100 iodine required to just produce a perceptible rose tint in the liquid.

Calculations:

Number of cc $Na_2S_2O_3$ used minus the number of cc iodine used x factor x 12.2=oz. of gold (Troy) per gallon oz. of gold x 20=pwt. gold per gallon.

* Parts 1 and 2 were published in our issues of June and July, 1926.

Managing a Job Plating Shop

Attention to System and Small Details in Estimating, Planning, Routing and Shipping. From the Monthly Review, April, 1926

When the art of electroplating, as applied to industry, was young, the process was in some cases carried on in a shop aside from, and independent of the manufacturing plants; that is, of the foundries, metal fabricators, assemblers, etc.

It was generally conceded that plating was a practice that they understood little about, and as long as the work, service, price, etc., were right, many of the manufacturers had no desire to combine the finishing and manufacturing of their goods. But after a few years the metal industry made such rapid strides, and the demand for electroplating and its allied finishes became so acute, that in the case of the larger manufacturers, it was no longer practical to send their product out to be finished. This resulted in the installation of many plating plants. But I have been informed that in the early days many of the smaller makers of metal goods who did not have enough of finishing to warrant the installation of a finishing plant were forced to do it because of inadequate service or the absence of a good job plating plant in certain localities. It has been observed by the writer that in the case of the smaller manufacturers, the above condition has been prominent in recent years also.

Some of the makers of metal goods on a smaller scale have advised me that because of poor work, high prices, etc., they were forced to install a plating plant in order to compete with the "big fellows." The manufacturer in this case is under the impression that he cannot afford to pay a first cless plater the wages he demands, and when something goes wrong with the solution or elsewhere he depends upon the superintendent or some outside source to pull the plating room from grief. In all fairness to the superintendent or others who step into a plating room and attempt to straighten out the trouble, it has been my experience that this is a very extravagant way to run a finishing department. To do good finishing economically and do it consistently, it is necessary in the majority of cases to have a good plater in charge of the solutions and on the job all of the time. Therefore, a wide-awake plater with a well-equipped job shop in this case renders a real service.

On the other hand, there is the manufacturer whose finishing does not run into large quantities, who thinks he can finish his work more cheaply and better in his own plant than outside and thereby eliminate the disadvantages he thinks are associated with sending his work out. In this case it is up to the job plater in his locality to prove which is the best practice. It is very important in this event, assuming that the manufacturer is agreeable, to give the job plater a chance to bid on his work that the plater go very carefully over the problems of the manufacturer in question and make sure that his plant is equipped to give service and give it economically. If the plater cannot do this, it is a very good policy to admit it, for if he gets the work and makes a botch of it, neither he nor anybody else will get a chance at it again and the manufacturer will rightfully have a bitter opinion of all job finishing plants.

The manufacturer above mentioned represents the nucleus of the work for the job finishing plant, that is, at least in the East; other sources of work in order are the overflow of large manufacturers at certain seasons of the year; jobbers of metal goods (this applies to distributors who maintain an office in some of the larger cities, getting their work made and formed at various foundries and machine shops from where it is shipped to the job plating plant to be finished and packed. This represents a very desirable source of work for the job plater).

There are also jobbers who buy unfinished work (in most cases from bankrupt plants), have it finished to make it salable; refinishing of work for hotels, restaurants, railroads, etc.; also refinishing work for retailers, jewelry stores and the like; household work, stove parts, lamps, etc., and the refinishing of automobile trimmings.

BIDDING ON THE WORK

The popular idea that the price of a job can be lowered after it is made, more easily than it can be raised, is outlawed in most cases, particularly in recent years, not only because of competition in your own immediate line, but of competition in general. What is meant here is this: a concern or a jobber who has no plating plant is bidding on a contract along with a number of other concerns in the same line who maintain a plating plant. Now, your prospective customer knows his costs pretty well up to the finishing. What the cost is here, as a general rule, he has no idea. This concern or individual must be given the lowest possible price the first time because if your rates are too high you not only beat him but you do yourself out of the job.

In bidding on work that has to be hand-polished, it is a good idea to get a quantity to try out before setting a price, having your foreman polisher or somebody that you can hold responsible, do the work on the samples. If this is not possible, and it is not, of course, on odd lots of work, somebody that knows polishing costs should make the price.

The price for barrel plating can be pretty nearly determined by the condition, finish desired, size, etc., of the merchandise.

The transportation cost, furnishing of containers or shipping cases, racks or special equipment, should be strictly understood by both parties when the job is taken.

TRANSPORTATION

A strict check should be made on the incoming work because a job plater has enough trouble laid at his door without getting blamed for the loss of a small lot of work that has never reached his plant or the shrinkage of a large shipment that was short weight when received. A system should be maintained to weigh and record every shipment that comes in; also a memo with the finishing specifications following each lot of work through the plant. Although the customer has agreed to furnish containers or cases, it should be seen to that shipping containers are in good condition when the goods leave your plant. I have seen a shipment of nicely finished work sent out in barrels in such bad shape that the goods either fell out in the truck or were scattered in the receiving room of the place they were consigned to, which caused the manager to say, "I wish we could see our way clear to do our finishing on our own plant." Now, this is one of the many small details that should be provided for. If the cases or barrels are in a bad shape when received, they should be either repaired or substituted by new ones. Before replacing the finished work it is a good plan to make this part of one of the men's work. A little co-operation of this sort has been found to pay and I have yet to see anyone intentionally

impose upon it. Also see that the finished goods are well covered when shipped in wet weather.

PLATING SPECIFICATIONS

Too many people are under the impression that when iron or steel is nickel plated, it is rust proof. From the individual with a pair of rusty head-light rims to the concern with a ton of work, they should be given to understand just what to expect. I have in mind a concern which had a very good auto accessory that was in demand. This accessory had a rim attachment to be polished and nickel plated, that when in use was exposed to the elements, and which they intended to make out of steel. In fact, they had already received the raw material and had begun operations on it. They were given a price for the finishing of this item, but when told that it could not be guaranteed from corrosion for the use it was intended, they were incredulous and took up the question with a manufacturing concern in town, who, although they did a great deal of plating on steel parts, used their product inside and never at any time exposed it to the outside elements. Therefore, when the manager or purchasing agent told the maker of automobile accessories that their concern never had any trouble with rust, it was a perfectly honest and well-meant statement. When the goods were finished they certainly looked nice, but after the jobbers and garages started to receive complaints about rust. Then the fun began. After a non-corrosive metal was secured and the trouble was overcome it was conceded that the experience with steel was very costly.

A large quantity of steel parts was nickel plated by the barrel process for a concern some time ago. Nothing was said about the use for which they were intended, and as the finish looked very good, the customer was well pleased. After about six months, however, he came back very much dissatisfied. The parts were put to use on a device that was used on ocean liners and were returned in a rusty condition.

"Just think of it!" he said, "the nuts were rusted so badly we could not get them off the bolts." The above cases are only characteristic of many that have come to grief where a thorough understanding was absent of what to expect of a finish.

HANDLING OF THE WORK

First of all, the job shop from an equipment standpoint, must be in a position to handle such work that is coming in steadily, as expediently as possible, making sure that his wheels, in the case of polishing, and his barrels in the case of tumbling, are in a condition to do the work efficiently. I mention this for in the handling of various lines of work it is very easy to go ahead with a new job without removing the sometimes injurious traces of the previous work. The solutions, type of barrels, type of racks must be right. To give an illustration of what is meant here: a few hundred pounds of small screws were received which were reasonably free from grease. The work was tumbled about twenty minutes in a wet barrel, using potash and cyanide, then transferred to the plating barrel and plated an hour; afterwards tumbled in soap water, dried ont in sawdust with very good results. Now, some rods about ten inches long, in a very greasy condition, were received and were put through the same operation with the result that the rods came out peeled. Not only was the cleaning at fault here, but a plating barrel running at a current density to efficiently plate small articles will not efficiently plate large pieces. Now, if the rods were first put through boiling potash, rinsed, put through hot soap water, colored in sawdust or in balls, depending on the desired finish, and plated in the same barrel with half the current but the same length of time, the results would be satisfactory.

Now, assuming that the rods were properly cleaned, they could be plated in the same barrel mentioned for one-half an hour and would not peel. (If left in an hour they would blister and peel anyway). But I question the wearing quality and resistance to corrosion that the half-hour plate obtained this way offers.

Still a better way of plating various kinds of work in a barrel is to have suitable barrels for different types of work. For instance, the small work could be plated very well in a celluloid roll with all the perforations possible, as this type of work needs more current and will roll evenly without any fear of cracking the panels. The larger type of work can be plated in a heavier wooden barrel without so many perforations. This, of course, does not draw as much current, consequently will not peel or burn at the ends and the life of the barrel will be longer. When the above can be carried out it has proved to be better practice than altering either the solution or the current, as it has a tendency to lessen the dependence on the human element.

Another phase in the handling of the work is to find out if possible for what use the work is intended. In some cases the appearance and shape of the work suggests its use, but in many instances it does not. For example, we took a contract to nickel plate certain parts of a nationally known toy. As most of the parts were small the work was mostly of a barrel nature. To insure a good luster we were taking great pains with the rolling of the items. A visit to the manufacturing plant and an examination of the finished product revealed that some of the parts were partly concealed and the background was such that a semi-bright finish was really more desirable. This same illustration would, of course, apply to work of a hand-polished nature.

Some merchandise of chain nature was sent in to be brass plated. This work was about ten inches long and could be very nicely handled in a barrel, but for one reason—there was a piece of sheet metal about two inches square on either end, which, when rolled in the usual way, resulted in a tangled mass. Now, the specifications for this finish were not very rigid, but all work had to go out at least of uniform color and have a good adherent plate, and in plants where the work is coming through every day, the condition mentioned would not be very serious as standard equipment would be available. But in job plating, although the work comes through in fairly good quantity, it comes at intervals of two or three months. The first lot was assembled and had to be plated that way, of course. It was put on hooks, one-half dozen on each hook, run through a hot potash, pickled, copper-plated and brass-plated, after which it was bright-dipped, rinsed well and dried. This was explained to the customer and it was pointed out that if the work was plated before assembling it could be finished by the regular process, thereby saving a lot of handling and obtaining, if anything, a better finish. The customer willingly gave his co-operation, took a little more pains in assembling the finished work; the only inconvenience being in the use of solid brass rivets.

A job plater must bear in mind that the handling of small lots intended for samples is very important. Oftimes a very important contract hinges on this, as well as on the first shipment of goods. Great care should be used in the finishing of new and unfamaliar lines of work as the alibi "we had to experiment with the first batch of work" has its limitations when some work, that great care and pains were used in producing, was spoiled in the finishing.

The above methods of handling apply to the manufacturer, distributor, jobber, hotels, etc., in which cases, as a general rule, the orders are repeated. This type of work builds the foundation for the successful job shop. Odd lots of automobile trimmings, household goods, stove parts and the like, can be sandwiched in to good advantage.

Metals at the Sesqui-Centennial

Lighting Equipment and Metal Products Show Growth and Importance of Metals in Industry

Copper is king of yet another realm, having annexed the big Sesqui-Centennial International Exposition now being held in Philadelphia, Pa., in celebration of the one hundred and fiftieth anniversary of the adoption of the Declaration of Independence. Electricity is conveyed throughout the expansive area of the mammoth show by means of a system of wiring whose ramifications reach to every section of the two thousand acres.

For League Island Navy Yard adjoins the Exposition proper, and the thousand acres it covers are thrown open for the inspection of Sesqui visitors. It constitutes the most imposing of the many Government exhibits.

A few of the more prominent features of the lighting scheme for the Exposition serve to indicate the extent of King Copper's participation in the Sesqui-Centennial.

Just before the visitor reaches the entrance gates of the Exposition he sees, swung across Broad street, twenty-two feet above street level, a colossal Liberty Bell, the symbol of the Sesqui-Centennial celebration, a reproduction of the famous original in Independence Hall, including the crack and the firm name of the makers. The bell is 70 feet high and 50 feet in diameter. It weighs 43 tons.

As the visitor draws near he finds the bell studded all over with incandescent lamps. There are 26,000 of them and they employ 500,000 candlepower, sufficient light for a fair-sized town. The bell hangs between two massive decorated columns supporting a cross-bar.

Another prominent illumination feature is under construction and was completed about the middle of July. The five-staged Tower of Light, 200 feet high, is surmounted by a 60-inch Sperry searchlight, employing 200,000,000 candlepower. The separate stages of the tower are bathed each in a different colored light: red at the top, followed in turn by amber, blue-green, green and blue at lower level. Flood-lights to the number of 288 specially designed and equipped with lace color caps placed over the lamp bulbs are used for the purpose.

Additional floodlights installed some distance from the base of the tower spray the tower with white light in variable intensity, from zero to maximum, creating marvelous effects as it is carried over the spectrum colors of the various stages of the tower with more or less power. The lower portion of the structure is flooded with clear light, the interior rotunda being illuminated by special metal reflectors.

The result is the nearest approach to a reproduction of the Aurora Borealis that the ingenuity of man has yet devised. Altogether this lighting feature employs 1,800,000,000 candlepower. The topmost beacon is visible as far away as New York.

An electric fountain, to produce whose rainbow effects twelve different schemes employing a hundred varying color arrangements have been devised, will be a marked feature of the colorful landscape amid which the various attractions of the Gladway, the amusement center of the Exposition, are located. The fountain is valued at $50,000.

All the buildings are illuminated by electricity, and many are the devices employed to attract attention to exhibits by means of lights skillfully arranged. A model electrically fitted home is an outstanding exhibit.

Those whose interest lies in the metals other than steel and iron will have, in the exhibits of the various big palaces and other buildings, an unusual opportunity to judge for themselves the extent to which copper, aluminium, tin, zinc and the other useful metals, as well as the more precious, gold, silver and platinum, enter into the construction of the articles and conveniences of everyday usage. Exhibits arranged by the United States Government will illustrate much that is educational with regard to the various ores and other forms of metal production and the processes employed in developing them.

These exhibits will be found in the big palace, 880 feet long by 400 feet wide, half of whose exhibit space of seven and a half acres is devoted to the exhibits prepared by the civilian departments of the Government. Exhibits in the other half of the building present the last word in mechanical and electrical invention; mining; metallurgy; and freight and passenger transportation, railroad, marine and vehicular.

Another big edifice that will be of considerable interest to those concerned in the metal industry is the Palace of Liberal Arts and Manufactures, 964 feet long and 392 feet wide, and providing seven and three-quarters acres of display space, which houses comprehensive exhibits of cutlery, silverware, hardware, chemicals, electrical devices, office furnishings, cash registers, calculating machines heating apparatus, plumbing fixtures, household appliances, furniture, musical instruments, pottery and countless other articles in everyday use. Paper making, printing, publishing, bookbinding, and allied arts are represented by exhibits that are of unusual interest. Modern methods of communication are demonstrated by exhibits featuring the telephone, the telegraph, wireless and radio, the later developments of which would have been accounted as miracles a generation ago.

Many far-away lands have sent exhibits of interest to metal-workers, some of which will be found in the various buildings representing the participation of foreign countries and which represent the native characteristics of the homeland architecture. Yet others are found in the Palace of Foreign Exhibits and Agricultural and Fashion Display, an immense structure 970 feet long and 460 feet wide, enclosing eight acres and a half of display space.

Foreign countries exhibiting at the Sesqui-Centennial include: Great Britain, Holland, Sweden, Denmark, France, Germany, Spain, Italy, Austria, Hungary, Poland, Czechoslovakia, Bulgaria, Turkey, Tunisia, Egypt, China, Japan, India, Persia, Argentina, Brazil, Cuba, Haiti, and Panama.

New Aluminum Alloy

It has been reliably reported that a new German alloy of aluminum is being developed at the Technische Hochschule in Berlin and by the chemical manufacturing and tin smelting company Theodor Goldschmidt Aktiengesellschaft of Essen. It is understood that the new alloy is also being rolled and worked by a manufacturer of the same district. It is to be called "Montago." The new alloy is said to be still somewhat lighter than Duraluminum, but has the advantage that it can be machined and worked much more satisfactorily. The manufacturers state that they are not yet ready to bring it on the market because there is some additional information concerning the method of treating it which must be successfully worked out before it is ready for general introduction. (Trade Commissioner Theodore Pilger, Berlin, in Foreign Trade Notes.)

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

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EDITORIAL

THE ELECTRO-PLATER'S OPPORTUNITIES

The excellent paper by W. E. Hughes read at the Newark meeting of the American Electro-Platers' Society brought out clearly one of the most important factors which seems, in these days, to be somewhat clouded over, namely that a man's advancement depends more upon himself than upon his education. At the present time when everyone who can possibly do so is rushing off to college; when these institutions are almost without exception so crowded that they have long waiting lists and can pick and choose their students as they please, there is a tendency for the man who cannot take advantage of the facilities of the higher institutions of learning to feel that he will be left behind. The race is to the swift and the battle to the strong, and colleges and technical schools train men in swiftness and strength.

Mr. Hughes described the life of Michael Faraday whose discovery of the laws of electrolysis made electro-plating possible. Mr. Faraday was apprenticed to the trade of bookbinding but had small taste for this work. He attended a course of public lectures on chlorine given by Sir Humphrey Davy and was so fascinated that he wrote to him asking him for work in his laboratory. He appended to his letter the notes which he had made at the lectures. Davy was impressed by the letter and the notes, and shortly afterward placed him in his laboratory. So then, we find young Faraday, at the age of 22, beginning work at a salary of 30 shillings (about $7.50) a week. Certainly not a glittering position for a person of that age.

But ability told. It was not long before his work made him stand out and he became eventually recognized as a master throughout the scientific world. Without education or training in the conventional sense of the word, he rose to the position of one of the world's greatest scientists.

What is the point? Not everybody can get work in a great laboratory under great masters but everybody can do his work thoroughly and keep his eyes wide open and his mind alert. The plater who says "I have no chance" is mistaken. Every plating shop has its troubles and these troubles are the very stepping stones which he must use to advance himself. Close observation, accurate control, keen analysis of results and courage in coming to grips with difficulties are certain to result in improvement. Added to these must be an insatiable curiosity and a desire to know more.

And nowadays there are so many places in which the plater can find help. The Bureau of Standards has done heroic work in electro-plating. Read their bulletins. The technical journals are publishing more and more articles on plating problems and their solutions. Read them. And last, but certainly not least, the technical societies such as the American Electro-Platers' Society are making tremendous inroads on the formerly unknown regions of electro-chemistry and electro-plating. Join them.

To be sure, much of the material published and read may be on questions aside from those which concern the particular problem which may confront a plater in his shop. On the other hand, no one knows when new problems will crop up and one must be prepared beforehand. The fact that a plater is working on new solutions should not prevent him from reading about brass or silver. His shop may undertake this work at any time or he may change his position with consequent need for additional knowledge.

The whole matter can be summed up in a few words. Keep your shop running smoothly by watching the work closely and controlling the solutions. Read the technical press and the Bureau of Standards publications. Join the technical societies in your industry. This applies, of course, to any individual engaged in manufacturing operations, but perhaps more than others, to electro-platers. Their field is rapidly expanding and its future seems to be almost limitless.

CHROMIUM PLATING DEVELOPMENT

The recent merger, noted in this issue on page 349, of the Chemical Treatment Company and the Chromium Products Corporation to form the Chromium Corporation of America, is the first step in the simplification of the patent situation in chromium plating. Tremendous interest shown in chromium plating followed the announcement of commercial operation by the first two companies named above. Chromium plating obviously has such a wide field of application that no one who uses metals can afford to overlook its possibilities.

Not only did other companies enter this field but large manufacturing organizations like the automobile companies and electrical manufacturers experimented on their own account, and in some cases developed practical processes for their own use. Smaller concerns were in a quandary. It is always unsafe to enter into a new field in which patents are being litigated. For that reason, therefore, the two pioneers in this line combined to eliminate uncertainty in the minds of prospective customers. All patents are pooled and the operating staffs of both companies combined.

What effect this step will have upon those who are experimenting independently and have worked out methods of their own for their own use exclusively, is hard to say. It is certain, however, that so far as the smaller user of chromium plating is concerned, the situation will be greatly clarified. There should be much less danger of being involved in patent litigation.

The question of the advisability of operating a plant under license or using one's own process must of course be settled by the individual's own situation. Developing a process in a new field is always a difficult, and often a most expensive undertaking. On the whole it seldom pays unless the experimenter is extremely fortunate or has sufficient funds and a strong enough technical staff to see him through.

From the standpoint of the industry as a whole we feel that the merger is for the best interests of everyone involved, and should result in a marked increase in the use of chromium as a protector of the more corrodible metals.

BRASS FOUNDRY FUNDAMENTALS

In our July issue we began the publication of a series of articles by R. R. Clarke, superintendent of brass foundries for the General Electric Company at Erie, Pa., on the Fundamentals of Brass Foundry Practice. The second installment appears in this issue. This series will contain a description of the basic laws which control the melting and casting of metals and their application to practical foundry operations.

For some time Mr. Clarke has delivered lectures before various foundrymen's associations throughout the country on this same subject. At our instance he is putting these lectures into written form and expanding them with numerous practical illustrations. This series will, at a later date, be collected and put into book form.

The importance of the subject covered can hardly be over-estimated. Molding procedure has been largely a matter of rule-of-thumb and an accumulation of individual scattered facts gained by the molder or foundryman, one at a time, and at the cost of infinite labor—and lost castings. No general rules were available; in fact the idea of general rules was scoffed at. Mr. Clarke saw that all mechanical operations were subject to some general rules—the natural laws or physical principles applied to matter at rest or in motion. Mr. Clarke has reduced molding operations to those fundamentals. He has shown the application of the general laws of physics to foundry operations and illustrated these applications with practical examples.

In our opinion this work is one of utmost value. Undoubtedly many have recognized that foundry operations like all others are subject to laws of nature, but to our knowledge, no one has correlated them in language understandable by and interesting to the practical foundry operator. This has been Mr. Clarke's object and we believe that he has attained it.

We urge our readers strongly to read these articles carefully. They are not general vague discussions; they are thoroughly practical and are all the more practical because they rest upon fundamental principles. We view it as a matter for congratulation that a practical foundryman has recognized the application of scientific principles to his work and is not only applying them for himself, but teaching his methods to others.

LEAD STATUES

Statues and ornaments made of lead are beginning to come into vogue again. An interesting article in a recent issue of the New York Times magazine describes garden ornaments made of lead and shows illustrations of statuary, lamps, etc.

Lead has several features which make it suitable under proper conditions. The gray color is attractive when properly placed, it has resistance to a number of forms of corrosion, it is cheap and easily worked: For solid figures of not too sharp delineation it can be handled without difficulty.

It has certain drawbacks however, which must be borne in mind. It has not the strength of bronze and consequently can be applied only to figures which have sufficient support at all points. A flying figure supported on only one point would be unsafe. Smooth folds of drapery with bold outlines can be easily expressed but the limitations must be recognized.

The coming fashion of decorating gardens with ornaments of various characters should open an appreciable outlet for lead in the form of castings and decorated worked forms. Even in interiors, lead candle-sticks or lamps have been found attractive, and not at all incongruous when used as electric light fixtures.

COPPER LIGHTNING RODS

The recent destruction brought by a bolt of lightning in the Naval ammunition depot at Lake Denmark, N. J., would have been prevented, according to Professor Pupin of Columbia University, if the depot had been adequately protected by copper, scientifically applied. It would have formed an absolute means of protection against fire and other dangers from lightning. Professor Pupin's statement was as follows:

"If you have a house and want it protected from the dangers arising from lightning, put on a copper roof, protect the chimneys with copper sheeting and then connect the roof at a great many points by copper rods or heavy copper wire with the ground. The copper rods or wire must go deep into the ground until you strike wet soil.

Then you copper the sides of the house with copper sheeting or other metal and this must also be connected with the wet ground. If this is done, no lightning can get into the building and everything and everybody in it will be perfectly safe from that source of danger. The moral is, all ammunition depots and all structures where explosives are kept, should be constructed in that way."

Such protection as described above would be somewhat expensive for the average house to undertake, but certainly an ammunition depot should spare nothing. Professor Pupin added that lightning rods in themselves were also good but there must be enough of them where the danger is great and they must be well connected with wet ground. He recommended gilding at the top to prevent rust, but copper rods might not find this necessary.

TECHNICAL PAPERS

Pure Zinc at Normal and Elevated Temperatures. by Freeman, Brandt and Sillers. Scientific Papers of the Bureau of Standards No. 522.

A study has been made of the physical properties and crystal structure of pure zinc. Data are given on the following properties: coefficient of expansion, density, scleroscope and Brinell harness, tensile properties and crystal structure at normal and elevated temperatures. Proof is given that zinc has but one allotropic form between normal temperatures and the melting point.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

POLISHING AND BUFFING

To the Editor of THE METAL INDUSTRY:

Had occasion to drop in at your office recently in quest of information regarding an old business friend, whom I have known since 1898; in fact, was the first out-of-town salesman calling upon him.

Incidentally, I looked over the program of the American Electro-Platers Society and was attracted by one of the subjects to be talked upon at the evening session, June 30th, "The Choosing of Buffing Compositions," which, although not connected with the line for some ten years, I still take sufficient interest in to keep myself fairly posted as to what steps of progress are made.

While not a polisher by trade, my sixteen years' connection with one of the leading manufacturers of composition, make me feel that I have gathered a little knowledge in the manufacture as well as application and use of various compositions to accomplish the desired results upon diversified materials, be they iron, steel, metals, plated or non-plated, wood, glass, horn, pearl, tortoise-shell, celluloid or what not. I have gained sufficient knowledge by standing alongside the buffing-wheel, not hesitating to become begrimed from head to foot with buffing-dirt, to note by personal observation, the workings of a polishing medium (composition) to form conclusions and report to my house the results.

To begin with, the fat consistency, which primarily acts as a conveyor of the composition to the wheel, and to a certain extent contributes to its cutting qualities, is entirely regulated by the physical structure of the abrasive employed; whether silica (decomposed or not), pumice, diatamaceous earth, emery, sesqui-oxide of iron (rouge) or others.

If it is porous or fractures easily, it will absorb its weight of fat, pound for pound, down to one-third its weight.

If of a non-absorbing nature, the selection of fats of firm consistency must be employed.

Then again, the nature of the material to be buffed or polished must be taken into consideration; likewise the construction of the buffing-wheel and the material it consists of, as well as its size and speed it is run at.

To close, no polishing operation, be it done with a composition or rouge of the very finest texture and used on the softest faced wheel, **should** or **can be termed burnishing.** Examine any highly polished or finished piece of silverware, sterling or plated, even though it be dry-buffed, under the microscope, you will discover myriads of scratches, running in all directions, either produced by the sharp edges of the abrasive or buff threads or fibres.

Burnishing can only be accomplished by a bloodstone, agate or steel burnisher. It anneals the surface, by heating it, and still will not produce a perfectly smooth surface. Upon close observation it will appear wavy, as the operation is intermittent—not continuous.

There is one possible exception, where a perfectly smooth and even surface is produced by either mechanical or manual polishing, i.e., on lenses, optical, microscopic or telescopic. But that requires time to accomplish the desired results. There is a reason and very logical one, which I reserve the right to touch upon in a subsequent article.

New York, July 10, 1926. HENRY RINGHOF.

APPRECIATION FROM AUSTRALIA

To the Editor of THE METAL INDUSTRY:

Your answer to my inquiry re black nickel solution duly to hand. I have tried out the addition of benzoic acid as you suggested.

I am very pleased to say it has turned out very good, making the deposit much harder; so much so it cannot be scratched off as before the addition.

Thanking you for your help.

Sidney, N. S. Wales, Australia. H. D. WAIGHT.

New Books

Metal Plate Work. By C. T. Millis. Published by E. and F. N. Spon, Ltd. Size 5 x 7½, 512 pages. Price, payable in advance, $3.00. For sale by THE METAL INDUSTRY.

This is the fifth edition revised and enlarged of a standard work and authority on the subject of geometry applied to sheet metal work. It covers patterns and their geometry and also notes on metals and the rules of measurement and figuring for tin, iron and zinc plate works; coppersmiths, policy makers and others.

Among the departments covered in the book are the following: equal taper or inclination of slant; unequal taper; round articles; cones; pyramids; oblique cylinders; elliptical cylinders; special sections, etc.; pipe bending; metals, alloys, solders, soldering fluxes, tinning, re-tinning, melting points of metals and various other properties.

Enameling on Metal. By Millenet and Koningh. Published by Crosby Lockwood & Son. Size 5 x 7½, 112 pages. Price, payable in advance, $2.00. For sale by THE METAL INDUSTRY.

This is a practical manual on enameling and painting on enamel as applied particularly to gold and silverware and art metal work. It is a translation, from the French, of a well known volume by a practical worker in this field.

Special items covered are as follows: plant and equipment including furnaces; technology of enameling; art of the enameler; paillons and their application; matting the enamels; filing and polishing; hardening and softening; repairs; pickling and cleaning; gilding, plating and coloring.

Advertising Procedure. By Otto Kleppner. Published by Prentice-Hall. Size 6 x 9, 539 pages. Price, payable in advance, $5.00. For sale by THE METAL INDUSTRY.

This book was witten to show the inception of advertising ideas and their development and to trace the course of the advertisment through each of its many steps. The method of treatment is interesting as it carries through the advertisement from the beginning, in the form of an idea to the end in the form of published material. The steps through which it goes are as follows: the purpose of advertising; the preparation of advertisements; scheduling of advertisements; advertising research; layouts; direct mail advertising; magazines.

Corrosion: Causes and Prevention. By F. N. Speller. Published by McGraw-Hill Book Company. Size 6 x 9, 621 pages. Price, payable in advance, $6.00. For sale by THE METAL INDUSTRY.

Every book is welcome which attacks what is probably the greatest technical problem in industry today, namely, the wastage of materials by corrosion. The object of this book has been to take an inventory of the available information and classify it according to a single and practical system designed to make it clearer and more readily available to those who are unable to search the technical literature in detail. Although most of the book is devoted to iron and steel, the problem is such that it demands the attention of non-ferrous field, particularly in the use of protective coatings. A glance at the chapter heading below will show the importance of the fields covered and the value of the book to those who have to specify engineering materials, or advise on their use.

Nature and mechanism of corrosion; theories; influence of manufacture and treatment, influence of internal factors; external factors; principles and methods of corrosion testing; relative corrosion of ferrous metals; preventive measures; in atmosphere; in water; removal of dissolved gases; chemical corrosion; underground corrosion; stray-current electrolysis.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. PETTIS, Rolling Mill; W. J. REARDON, Foundry; W. L. ABATE, Brass Finishing; CHARLES H. PROCTOR, Plating Chemical; P. W. BLAIR, Mechanical }

ACID DIP FOR BRASS

Q.—What sort of an acid dip can I use to get a rich gold color on brass.

A.—You do not state the composition of the brass you desire to acid dip to produce a rich gold color. There is yellow brass and red brass known as gilders' or platers' metal; yellow brass which approximates 66% copper, 34% zinc; red metal 85% to 90% copper and 15% to 10% zinc. This metal would more nearly approach a gold color.

To produce the finish you desire, proceed as follows.

1. The grease must be removed with hot alkaline cleaners, then washed in water.

2. Any scale or oxide must be removed from the brass after cleansing by pickling in a solution prepared as follows:

Water	1 gallon
Sulphuric acid 66°	12 ozs.
Common salt	1 oz.

Temperature 140 deg. F. After the scale is removed, wash again in cold water.

3. Prepare a nitric acid dip in a suitable stoneware receptacle; the acid should be 38 or 40 deg. Immerse the brass articles that have been cleansed and pickled in the nitric acid dip for a moment, then wash in cold water again. Immerse in the hot alkaline cleaner for a moment then drain thoroughly. To produce the final lustre, the brass articles should be immersed in the following bright acid dip which should be prepared at least 10 hours previously.

Nitric acid 38°	2 gallons
Sulphuric acid 66°	1 gallon
Water	1 pint
Common salt	½ oz.

After bright dipping, wash thoroughly in cold and hot water and dry out in maplewood sawdust. Acid stains may be removed after acid dipping by immersing in a cyanide dip; water 1 gallon; sodium cyanide 2 ozs.—C. H. P. Problem 3,549.

BALL BURNISHING

Q.—I am having trouble with ball burnishing on steel stampings. I have glanced back over previous issues of your magazine and see that in the October issue Problem 3443 is a similar case to my own. At present I am running a 24 inch barrel 22 R. P. M. with soap bark, ½ oz. per gallon of water, but the only result I can obtain is a black finish with no lustre. Can you give me new data as to speed of solution?

A.—Your speed of rotation is too low to produce a bright lustre finish upon steel stampings. Furthermore soap bark is of no value for steel although excellent as a lubricating factor in ball burnishing nickel plated steel. The follow procedure will give you the results you want.

1. Increase your speed of rotation to 60 or 80 R. P. M. per minute.

2. All steel products should be thoroughly cleansed from grease or surface scale by usual methods.

3. The tumbling solution should consist of water 1 gallon; soda ash 58%, 2 to 3 ozs; sodium cyanide, ⅓ to ½ oz. Use plenty of steel balls. A one-hour tumbling under the methods outlined will result in a bright clean lustre on the steel articles.

You can plate the articles direct after ball burnishing by only a thorough cold water washing of your steel articles.—C. H. P., Problem 3,550.

BRIGHT BARREL NICKEL

Q.—I noticed in the late issue of the METAL INDUSTRY request how to get bright nickel silver. This has been one of our great problems. We have been running mechanical nickel plating barrels and our nickel plated work comes out of the barrel a sort of dark nickel. What we are after is a white nickel, or to get the finish such as you find on novelties in the 5 and 10 cent stores.

A.—A few years ago we gave the following formula for bright nickel plating of steel articles in mechanical barrels for similar products to yours. You can see the results in many 5-and-10 cent stores.

Bright nickel solution:

Water	1 gallon
Single nickel salts	12 ozs.
Nickel chloride	1 oz.
Sal-ammoniac	2 ozs.
Boracic acid	2 ozs.
Cadmium chloride	1/50 oz. or 10 grains
Muriatic acid	1/16 to ⅛ oz.

Cadmium is the brightening factor in mechanical barrel plating. Cadmium metal sticks are used as anodes for a regular barrel solution; 2 to 4 cadmium sticks being used, 9 inches long, ⅜ inch in diameter. The cadmium sticks should always be removed when the nickel solution or solutions are not operated for any length of time. Cadmium is a splendid factor but a detriment in solution when it is in excess. Not only will the nickel peel, due to extreme brittleness, but the nickel deposit will turn black and smutty just as though considerable copper had gotten into the nickel solution. We mention these facts so that you can go carefully in making additions of cadmium and play safe. Cadmium is added to nickel solutions almost universally at present. Your nickel solution can be made bright no doubt with the following additions based upon 250 gallons of nickel solution; smaller quantities proportionately:

Water, 1 quart	Temp. 120 deg. F.
Cadmium chloride	5 ozs.
Muriatic acid	10 ozs.

This is a stock solution. Add ⅓ of the total amount first to 250 gallons of solution, then repeat at intervals of several hours. Just as soon as the nickel deposit shows brightness, add no more for a time, to avoid an excess. Then put your cadmium metal stick anodes in the tank with the nickel anodes. Later when you accumulate ends of the cadmium sticks you can make your own nickel chloride by dissolving them in muriatic acid, using only sufficient acid to dissolve the metal.—C. H. P. Problem 3,551.

DIP SUBSTITUTE FOR POLISHING

Q.—We are brass plating various steel articles and would like to ask if there is a dip that we could use after plating that would be a fair substitute for polishing to reduce the cost. We have experimented with acid dips but find difficulty. If they are strong enough to give the desired results, they take most all the plate off.

If this is not practical what would you recommend as the best brightener for the solution so that we can at least get a plate that is not so foggy and heavy.

A.—Unfortunately there is no acid dip that you could use successfully to produce a bright brass deposit on brass plated steel. Any acid dip to produce such results would have a reducing action on the brass deposit. Therefore, to withstand the reducing action of such an acid dip, the brass deposit would have to be unusually heavy and uniformly deposited. The most satisfactory method would be to deposit a bright brass by the aid of arsenic additions to the brass solution at intervals when the brass deposit becomes dull. Arsenic is a splendid brightening factor but must never be added in excess or the brass deposit will become gray in tone.

The minimum amount of arsenic is 1 grain per gallon of solution, so 1 oz. would be ample for 437½ gallons of brass solution based upon the minimum amount as there are 437½ grains in 1 oz. avoirdupois weight. It is frequently necessary to increase the amount above 1 grain per gallon. The addition, when needed, should be made after a short period when the solution fails to

give the bright deposit, with 1 grain per gallon. We emphasize these precautions because many a good brass solution has been spoiled by excessive amounts of arsenic additions. To prepare the arsenic solution for 437½ gallons based upon 1 grain per gallon, prepare a solution as follows:

Water	1 pint
Caustic soda	4 ozs.
Powdered white arsenic	1 oz.

After adding the caustic soda to the water, heat to 180 deg. F., then dissolve the arsenic in the solution. When you become familiar with the addition of arsenic to your brass solution, you can prepare a stock solution based upon the proportions given.—C. H. P. Problem 3,552.

FINISHING BRONZE NAME PLATES

Q.—Please give me a complete method, from start to finish, to relieve two heavy cast bronze name plates, 2½' x 2' x ½", not to be lacquered.

A.—You do not mention whether you intend to apply the regular gun metal finish in the backgrounds of the bronze name plates. If you do, then pickle the sand off the plates with dilute hydrofluoric acid solution; 1 quart acid to 1½ gallons water, heated to 120-140 deg. F. Afterwards wash in water, brush down with a steel brush, copper plate in a copper cyanide solution for 5 minutes. Then remove and wash in cold and hot water. While still hot, sponge over a solution of polysulphide or sulphuret of potassium prepared as follows.

Water	1 gallon	
Polysulphide	¼ oz.	
Aqua ammonia	1/16 oz.	Temp. 140 deg. F.

As soon as the copper surface becomes the regular gun metal black, wash the tablets quickly in cold water and dry out thoroughly in hot water and sawdust. The high lights should now be polished with regular wooden polishing wheels, leather covered and the emery applied as usual with glue. You may have to use 80, 120 and 160 or 180 emery depending upon the castings and the final finish desired. After polishing, wipe off all bronze dust. If you have air pressure so much the better. To protect the finish, procure a small can of good floor wax. Brush all over the surface with a soft brush, then wipe down with a soft cloth. If a black background is not required, then you will have to either acid dip the bronze tablets, brush down with a steel scratchbrush or rub down with steel wool.

You will be able to decide from these suggestions, the best method to follow.—C. H. P. Problem 3,553.

IRON ON COPPER

Q.—Can you give me a formula for iron plating on copper? For the past five years or more, we have been plating engraved copper plates (used in decorating chinaware), using a solution made up of chloride of iron, salammoniac and water, (hit and hiss proportions), and have had very good results until about a month ago. The plates started peeling and we are unable to overcome the trouble. Time of plating, 1½ hours, using 1 volt and 11 amps. current.

Have just made up a new solution consisting of the following:

Sulphate of iron	2 pounds
Sulphate of Ammonia	2 pounds
Water	5 quarts

12 fluid oz. of the above solution—2 oz. Epsom salts.
½ oz. glycerine to each gallon of water.
Neutralize with Bi-carbonate of soda.
Anodes—Norway Iron.
Plating time 1½ hours. Current, 11 amps.—1 volt.

This solution gives a very good deposit, but it scraps off like powder. What we are trying to get is a good uniform and a hard deposit.

A.—Probably one of the best formulae for the deposition of iron is as follows.

Water	1 gallon
Double salts of iron and ammonium sulphate	3 pounds

Temperature 120 deg. F.; anodes sheet steel. The cathode should be agitated while plating. A vertical motion gives best results. Voltage, 1 to 3; amperage as found advisable without burning of the deposit. This solution is used extensively in building up steel articles turned undersize or for building up worn parts made of steel. It should prove satisfactory for your purpose. Agitating and heating your present solution may eliminate your trouble which is due to deposition of hydrogen gas in the deposit. Instead of using bicarbonate of soda, add small amounts of sodium perborate as the neutralizing factor; 1/15 to ⅛ oz. per gallon of solution should be ample. This material is used extensively in controlling hydrogen deposition in nickel deposits and may produce the same results in your present solution.—C. H. P. Problem 3,554.

LACQUER ON DIE CASTINGS

Q.—In our business we are using a zinc composition die casting manufactured by a die casting company on which we subsequently spray a lacquer finish. We are having considerable difficulty in making this stick as it has a decided tendency to chip off after the finish has hardened, there being only a slight adherence between metal and the finish.

The die casting people have suggested to us that by giving these castings a preliminary dip in some suitable acid the surface may be slightly roughened so that the Duco will find a better anchorage.

We do not wish to go to the expense of installing an exhaust fan and for that reason want to use an acid which will not produce any noticeable fumes. Your advice as to the proper acid to use, the strength to employ and the proper method of procedure will be very much appreciated.

The analysis of the castings we are using is as follows: 1¼ per cent aluminum, 4 per cent copper, balance zinc.

A.—We are going to suggest two methods which may answer your purpose. One is alkaline; the other acid. The die castings should be immersed in one or the other solution for a moment or so, then removed, washed and dried out, and then coated with the finish as may be required.

Alkaline Solution:

Water	1 gallon
Caustic soda	73-76 per cent—4 oz.
White powdered antimony oxide	½ oz.

Heat the solution to 160° F.

Acid Solution:

Water	1 gallon
Muriatic acid	1 quart
Chloride of antimony	¼ oz.

Temperature: 120°-140° F.

Immerse the die castings in either solution for a moment or two. They will darken perceptibly; then proceed as outlined. If the surface of the die casting is too dark, then omit the antimony salts in both solutions.—C. H. P. Problem 3,555.

PATTERN METAL

Q.—We are desirous of obtaining a non-shrinkable metal for pattern work and have under consideration two formulae for white metal, as follows:

Formula No. 1	50% Zinc 50% Tin
Formula No. 2	16 pounds of tin 3 pounds of lead 6 ounces of zinc 10 ounces of antimony

We would appreciate an expression from you as to what you believe would be the most economical and practical formula for us to use, also giving your reason for whatever decision you may make.

A.—We favor formula No. 1, as this metal has the minimum shrinkage when poured at the proper temperatures, which is gauged by inserting a pine stick and pouring when the metal will no longer burn the stick. It also casts well and makes a smooth casting, easy to solder and is quite satisfactory for pattern work. It is stronger and tougher than Formula No. 2, casts sharply and can be cast over and over without losing its quality if no other metal is mixed with it. It is also cheaper than formula No. 2.

To secure a good metal it is necessary to use virgin tin, straits preferred, and refined zinc.—W. J. R. Problem 3,556.

PATENTS

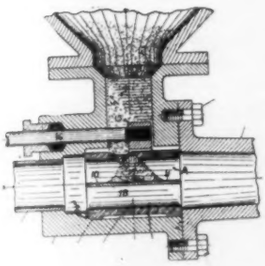
A REVIEW OF CURRENT PATENTS OF INTEREST

1,591,017. July 6, 1926. **Polishing Machine.** William E. Cook, St. George, N. Y., assignor to Peerless Insulated Wire and Cable Company, New York, N. Y.

A polishing machine embodying therein a plurality of polishing elements, each of said elements having a substantly flat, smooth, extended surface presented towards the axis of rotation of said elements, supports for said elements whereby they are grouped about a common axis, means whereby said supports are rotated, and means operative upon each element whereby rotation of said supports at high speed will cause each element to have movement toward the axis of rotation of said supports.

1,591,049. July 6, 1926. **Anticorrosive Compound.** Catherine D. Murray, Bridgeport, Conn.

A composition for preventing corrosion on metallic surfaces, comprising vaseline 45%, asphaltum 25%, red lead 29% and one per cent of a compound comprising methyl salicylate 40%, oil of citronella 40% and oil of red cedar 20%.



1,591,667. July 6, 1926. **Sand-Blast Apparatus.** George C. Fatscher, New Haven, Conn., assignor to the New Haven Sand Blast Company, New Haven, Conn.

In sand blast apparatus, a mixing chamber, abutments of less diameter than the chamber at opposite ends thereof, a tubular lining for the chamber engaged between said abutments and having an opening in its upper wall to form a sand feed port, together with a feed plate horizontally sub-dividing said lining.

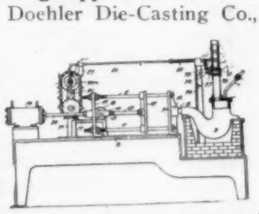
1,591,983. July 13, 1926. **Process of Coating Iron or Steel Articles.** Irvin J. Koehnline, Bridgeport, Ohio.

The process of coating iron or steel articles which consists in cleaning said articles and dipping the same in a bath of tin containing less than 20% of aluminum.

1,592,102. July 13, 1926. **Material and Process for Preventing Metal from Rusting.** James H. Gravell, Elkins Park, Pa.

The process of developing a coating of phosphate on metal consisting in treating the metal with an admixture comprising phosphoric acid and pine oil.

1,592,125. July 13, 1926. **Die-Casting Apparatus.** Charles Pack, Elmhurst, N. Y., assignor to Doehler Die-Casting Co., a corporation of New York.



In a die casting apparatus, in combination with a die support including two separable clamps, a melting pot for the casting metal having a discharge nozzle adapted to feed the molten metal directly to the die, means for delivering pressure fluid on top of the molten metal in the pot to expel a quantity thereof through the nozzle into the die, means for separating the clamps to open the die, and means controlled thereby for feeding ingots to the melting pot at desired intervals relative to the operations of the clamp separating means.

1,592,160. July 13, 1926. **Method of Producing Magnesium-Silicon Alloy.** Walther Schmidt, Bitterfeld, Germany, assignor to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

The method of producing alloys of magnesium and silicon containing up to 15% silicon and being technically free from iron comprising a compound containing iron and at least 20% silicon to react with an excess of molten metallic magnesium.

1,592,302. July 13, 1926. **Heat Treating Magnesium Alloy.** Zay Jeffries and Robert S. Archer, Cleveland, Ohio, assignors to American Magnesium Corporation, Niagara Falls, New York.

The process of improving certain of the physical properties of magnesium base alloys and particularly the hardness, comprising the heat treatment of a super-saturated solid solution of magnesium and aluminum at a temperature of approximately 125° to 300° C. for a period of time sufficient to cause precipitation of a hard constituent therefrom in the from of very small particles.

1,592,306. July 13, 1926. **Process of Recovering Nickel.** Winfield Schley Lienhardt, Stapleton, N. Y., assignor to Metal & Thermit Corporation, Cartaret, N. J.

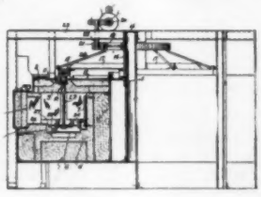
In the recovery of nickel from solutions containing the same and also containing sulfuric acid by the precipitation of the nickel as such by metals higher in the electromotive series, the process which comprises adding material giving the chlorid ion to such a solution prior to precipitation.

1,592,307. July 13, 1926. **Process of Recovering Nickel.** Winfield Schley Lienhardt, Stapleton, N. Y., assignor to Metal & Thermit Corporation, Cartaret, N. J.

In processes of recovering nickel from sulfuric acid solutions by the use of metals higher than nickel in the electromotive series of metals as precipitant, the addition to a sulfate of a metal not precipitated by iron to such solutions prior to contacting the same with the precipitating metal.

1,592,935. July 20, 1926. **Process of Recovering Tin.** Elmo G. Hickey, Los Angeles, Calif.

In a process of recovering tin from tin scraps, employing caustic alkali solution, the step which includes the use of ammonia as an energizing agent.



1,592,967. July 20, 1926. **Rotary Furnace.** Frank T. Cope, Salem, Ohio, assignor to the Electric Furnace Company, Salem, Ohio.

A furnace having a slot in its roof, a supporting member movable along said slot, rods suspended from the supporting member through said slot, and a hearth suspended upon said rods.

1,592,994. July 20, 1926. **Metallic Composition.** John R. Townsend, Brooklyn, N. Y., assignor to Western Electric Company, Incorporated, New York, N. Y.

An electrical contact element composed of phosphor-bronze alloy and lead, the amount of lead being in slight excess of its solubility.

THERMIT PATENTS SUSTAINED

Decision was recently rendered by the United States District Court of New Jersey, Judge Bodine presiding, in the case of the Goldschmidt Thermit Company, a subsidiary of the Metal & Thermit Corporation of New York, versus the Alumino-Thermic Corporation of Roselle Park, New Jersey, Hugh G. Spilsbury and Henry J. Barnes, manufacturers of a material called "Feralite" for aluminothermic welding. The suit involved three patents covering essential features of aluminothermic welding. All three patents were sustained in the broadest terms and found to be infringed. The Court has stated that a decree for an injunction and accounting may issue.

One of the patents sued on, covers the aluminothermic mixture, or welding material, another covers the welding process involving preheating as a step and the third covers the insert rail weld whether having a loose insert or one made by cutting back the web and base. The latter practice is commonly known as "undercutting."

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Gas Furnaces in Melting Brass

A Comparison Between Gas and Coal Fired Furnaces, Showing Comparative Costs and Performance

A Survey Made by A. C. NIELSEN COMPANY, Engineers, in Collaboration With and Approved by S. J. RILEY, Mechanical Superintendent Liquid Carbonic Company, Chicago, Ill.

About a year and a half ago this company replaced fifteen of its thirty coal fired brass furnaces with six gas fired furnaces equipped with combustion Utility recuperators. The gas furnaces now handle the bulk of their production, the remaining coal furnaces being used only for special alloys. They melt yellow brass, red brass, phosphor bronze, hard brass and aluminum.

OPERATING HOURS—CRUCIBLE SIZE

As a rule, all six of the gas furnaces are in operation nine hours a day. Number 80 crucibles, holding 240 lb. of metal, are used.

NUMBER OF HEATS

With the gas furnaces the first heat in the morning takes about an hour and fifty minutes, subsequent heats requiring only 45 to 55 minutes. While they normally produce four heats per furnace per day, six heats can be secured without difficulty.

COST USING GAS

During March, 1926, which was a typical month, 120,614 lbs. of metal were melted in the six gas furnaces. The gas consumption was 656,698 cu. ft., or 5,445 cu. ft. per 1,000 lbs. of metal. The gas cost was $446.32.

As shown on the attached sheet, the total operating cost, including all items except supervision and general overhead, amounts to $800.40 for the month. This is $6.64 per 1,000 lbs. of metal.

PRODUCTION WITH COAL

For comparative purposes, the monthly cost of operating eight coal fired furnaces has been calculated, and is shown on the attached sheets. Each coal furnace has an average daily production of three heats, or 720 lbs. of metal, although four heats can be obtained by forcing them to the limit. In a 24-day month, these eight furnaces would produce 138,240 lbs. of metal.

COST USING COAL

Since each furnace consumes 375 lbs. of hard coal daily, the monthly consumption for the eight furnaces would be 36 tons, which is figured at $20.00 per ton, delivered on the foundry floor. Two men are required for regular operation, and two extra hours must be charged for the man who reports early each morning to get the fire started.

Repairs on the coal furnaces are about 20 per cent higher than on the gas units, because of the patching of refractories made necessary by the scalping of the linings when cleaning the fires. With the coal furnaces the melting cost, exclusive of supervision and general overhead, amounts to $9.18 per 1,000 lbs.

COMPARATIVE COSTS

Since the cost with the gas furnaces is only $6.64 per 1,000 lbs., the net saving is $2.54 per 1,000 lbs., or $3,676.32 annually. This represents a reduction of 28 per cent in the melting cost, and a net annual return of 102 per cent on the investment.

HANDLING COAL AND ASHES

In addition to making this saving, the use of gas eliminates the hauling of coal to the furnaces and the removal of ashes. Since the foundry is on the fourth floor, these operations were always troublesome.

DEPENDABILITY OF FUEL SUPPLY

Gas provides a more dependable source of fuel. If they had relied on hard coal during the past year they would have been confronted with a serious shortage.

RAPIDITY OF HEATING

The greater rapidity of heating with gas is indicated by the fact that the gas furnaces can produce a maximum of six heats a day, compared with four heats with the coal furnaces. Gas also permits more accurate control of temperature.

EXPERIENCE WITH OIL

Prior to the installation of the coal furnace oil was used, but they decided to abandon it because the oil and metal fumes caused the employes to suffer from "brass chill." Even extensive hoods over the furnaces failed to eliminate this trouble.

In winter the oil had to be heated to make it flow. Leakage of oil lines and pump was a cause of annoyance. They had to install a 40′ x 8′ diameter underground oil storage tank—an expensive item. Burners required considerable maintenance. All factors considered, the experience with oil was unsatisfactory.

In addition to using gas for melting, this company employs it for soldering and cooking.

COST OF OPERATING 8 COAL FIRED BRASS FURNACES

Depreciation—$1,600.00 ÷ 5 years		$320.00
*Average interest at 6% $\frac{6}{5} \times \frac{1{,}600.00 \times .06}{2}$		57.60
Maintenance and repairs including replacing refractories every year, patching, etc.		960.00
Fixed expense, per year		$1,337.60
Fixed expense per month—$1,337.60 ÷ 12		$111.47
Labor—		
Operation—24 days × 9 hr. × $.85 × 2 men	$367.20	
Firing in morning—24 days × $1.70	40.80	408.00
Coal—36 tons at $20.00 (cost placed in foundry)		720.00
Cost of operating blower		29.28
Total cost per month		$1,268.75
Weight of metal melted—720 lb. per furnace per day × 8 furnaces × 24 days		138,240 lb.
Melting cost per 1,000 lb.—$1,268.75 × 1,000 / 138,240		$9.18

COST OF OPERATING 6 GAS FIRED BRASS FURNACES FOR A TYPICAL MONTH (MARCH, 1926)

Depreciation—$3,600.00 ÷ 5 years		$720.00
*Average interest at 6% $\frac{6}{5} \times \frac{3{,}600.00 \times .06}{2}$		129.60
Maintenance and repairs, including replacing refactories every 18 months, renewing covers every 6 months, cleaning recuperator twice a month, etc.		600.00
Fixed expense, per year		$1,449.60
Fixed expense, per month—$1,449.60 ÷ 12		$120.80
Labor—		
Operation—24 days × 9 hrs. × $.85	$183.60	
Firing in morning 24 days × 1 hr. × $.85	20.40	204.00

*Allowing for interest earned by depreciation reserve.

Gas—656,698 cu. ft.	446.32
Cost of operating blower	29.28
Total cost per month	$800.40
Weight of metal melted	120,614 lb.
Melting cost per 1,000 lb.—$800.40 × 1,000 / 120,614	$6.64

*Allowing for interest earned by depreciation reserve.

SAVING EFFECTED BY GAS FIRED BRASS FURNACES

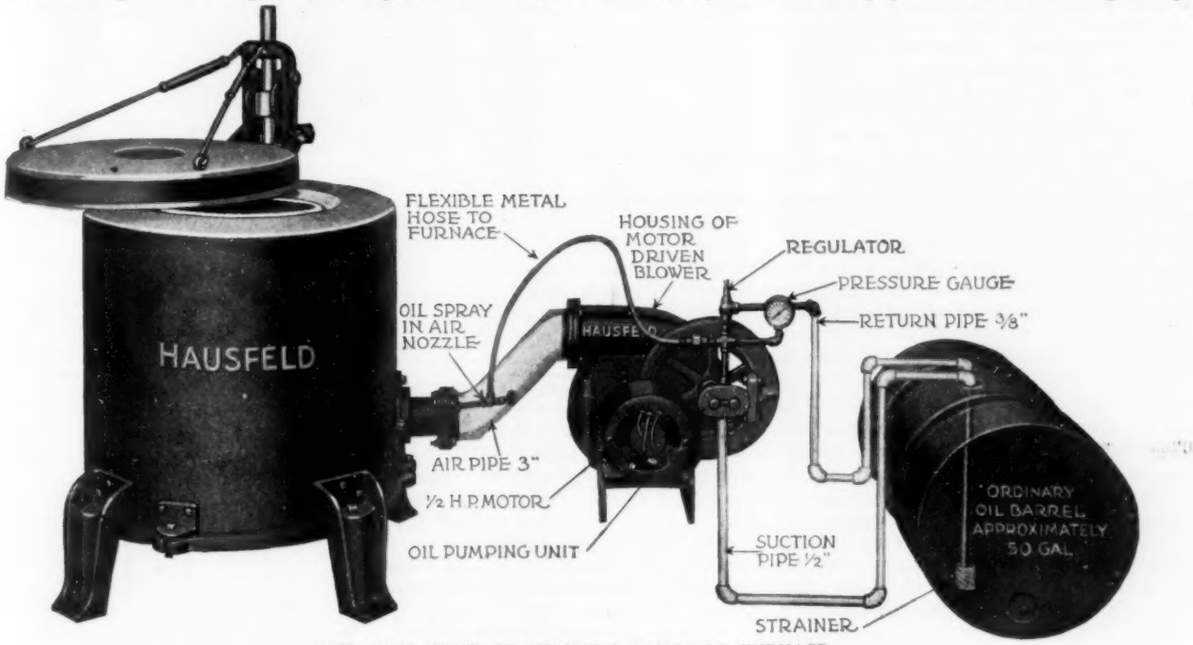
Cost per 1,000 lb.—coal furnace	$9.18
Cost per 1,000 lb.—gas furnace	6.64
Net saving, per 1,000 lb.	$2.54
Net saving, per month—$2.54 × 120,614 / 1,000	306.36
Net saving, per year—$306.36 × 12 months	3,676.32
Net annual return on investment	102%
Per cent reduction in melting cost	28%

SUMMARY

Gas fired furnaces replace coal for brass melting.
Produce 4 heats daily—6 heats maximum.
Consume 5,445 cu. ft. of gas per 1,000 lb. of metal.
Melting cost with gas—$6.64 per 1,000 lb.
Melting cost with coal—$9.18 per 1,000 lb.
Cost reduced 28%.
Annual saving is $3,676.32.
Net yearly return of 102% on investment.
Gas more dependable.
Faster heating.
More accurate temperature control.
Experience with oil unsatisfactory.

STATIONARY CRUCIBLE FURNACE UNIT

The Hausfeld stationary type crucible furnaces, Styles 180 and 800, have been developed to meet the demand from the smaller brass foundry. Style 180 accommodates a No. 60 Crucible and Style 800 accommodates up to a No. 90 Crucible. Either style can be built to accommodate most any size of standard crucible down to No. 35. It is stated that one stationary type crucible furnace operated on oil or gas fuel will give as much production as two furnaces using the same size crucible operated on coke or coal fuel.



COMPLETE UNIT STATIONARY CRUCIBLE FURNACE

The Hausfeld stationary crucible furnace is equipped with a motor driven blower, the motor being connected directly to the fan of the blower, operated with a ½ H.P. Motor. When oil fuel is used the same motor drives the oil pumping unit that drives the blower and the oil pump is mounted on the base of the blower and directly connected by gear to the motor drive shaft.

The number of heats per day from this furnace is usually six, but it is stated that they can very easily get eight and ten heats from each furnace on brass or bronze, and on aluminum, from fourteen to eighteen heats per day.

While the majority of these furnaces are furnished as complete units, the furnace can be supplied without the motor-driven blower and with the necessary connection for oil and air from a central station already installed in any plant. Metal containing a high per cent of nickel can be melted in this furnace, and grey iron, if necessary.

Style 180 furnace is 25 in. in diameter, the Style 800 furnace is 27 in. in diameter. The furnaces are lined with a circular brick, tongued and grooved on the end; practically the same size as a standard brick, except curved to fit the drum. The top and bottom brick are in one piece. The bottom brick is solid and the top brick has a center opening.

ERIE STYRIAN STEEL ROLLS

The Blake & Johnson Company, Waterbury, Conn., are exclusive agents in the United States for Erie steel rolls. They are manufactured by Schoeller-Bleckmann Steel Corporation of Austria. The main office is at Vienna and the rolls are produced at the largest plant of the company located at Ternitz, South Austria.

The chief advantage claimed for Erie rolls is in the fundamental purity of the Styrian ore which is particularly free from sulphur and phosphorous. All rolls correspond to American practice, being standard smooth-ground on the bodies. Necks are not hardened unless so ordered.

STYRIAN STEEL ROLL

MIRROR FINISH

For certain special work, special strip steel, thin brass, and various foils, the Blake & Johnson Company is prepared to furnish a high polish or mirror finish at a slight extra charge. For mills which are unable to restore the mirror finish after the rolls have become worn in service, they are prepared to refinish the rolls in their own plant, at Waterbury. This can be done whenever regrinding is necessary during the entire life of the roll, equaling the original finish at all times. Samples of this finish also, on application.

Erie steel rolls are guaranteed against pin holes, heat checks, spalls, and from spots, also against breakage or any other difficulties encountered in normal service, excluding abuse or accident.

NEW CLEANING MACHINE

In the shops of the Belke Manufacturing Company, Chicago, recently, William Belke, president of the company, and the heads of electro-plating departments of many large firms in Chicago, viewed, for the first time, the successful operation of a new machine. A new slusher was being given its maiden tryout. The arms of the slusher, carrying metal articles, moved slowly up and down in the soda solution, throwing dirt off.

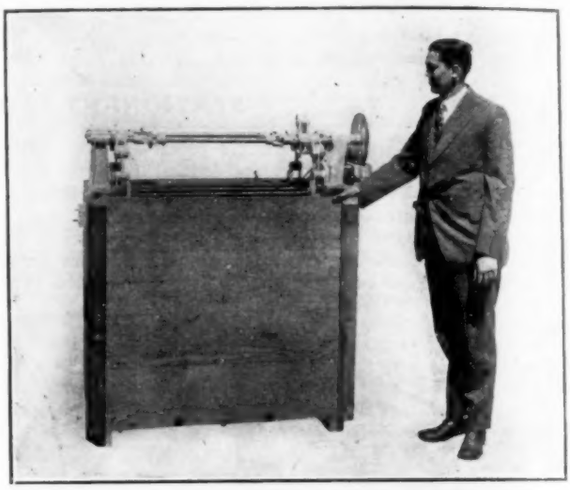
The new Belke slusher has for its object greater speed in cleaning metal articles. Formerly metal was placed in the caustic soda cleaning bath and allowed to remain motionless as the solution loosened the dirt. Sometimes the water was slushed by hand, to keep up an action which would throw off the dirt, but more often another operation was necessary, and labor was required to clean off the loosened dirt.

The slushing machine moves the metal up and down in the bath, throwing off the dirt as the solution loosens it. In one operation, it is claimed that the metal emerges absolutely clean.

Difficulty was met in creating a machine that would be simple in operation, and which would not break under the intensive service of electroplating plants. A quarter horsepower electric motor with a worm gear on its shaft, revolves a large gear, which in turn actuates two smaller gears. Attached to these smaller gears are two arms which carry a cradle up and down, and on this cradle are laid bars which extend from one end of the tank to the other. At the opposite end of the tank two arms move in synchronism with the cradle by means of universal coupling.

This provides power enough to lift over 300 pounds up and down. The slusher is attached to the side of the tank by means of a "C" Clamp, obviating the need of drilling the tank. A supporting bar, attached to the floor, takes all the weight from the tank. The rods or bars upon which the articles rest are quickly and easily removed. Dimensions of the slusher are made to conform exactly to the size of the tank.

The Belke Slusher is quickly installed, and has no belting, line shaft or pulleys. Work is lifted up and down a span of 4 inches, at the rate of 8½ times a minute—not fast enough to dislodge the work, but fast enough to clean thoroughly. The slusher can be used in cleaning work for articles too heavy for simple agitation methods.



WILLIAM E. BELKE STANDING BESIDE CLEANING TANK ON WHICH IS MOUNTED HIS NEW SLUSHER

NEW SPRAY GUN

The Eureka Pneumatic Spray Company, 87-28 130th street, Richmond Hill, Long Island, has developed a new model of sprayer known as No. 44 to meet the growing demand for a sprayer which will give a flat spray or a cone shaped spray as may be required, by quick change or adjustment.

This sprayer illustrated herewith is shown with the quart size metal container attached, pint size metal container and pint size glass container along side. A rather rigidly attached threaded member holds the container to the sprayer, obviating the union connection often used.

This gun uses the latest Eureka method, development of self-centering air and fluid nozzles, positive and dependable in their nature, with no loose or floating parts. When the air nozzle is screwed all the way back the gun gives a cone-shaped spray, advancing a half-turn, changes it to a flat or fan-tail spray and a quarter turn of the nozzle changes from a vertical to horizontal spray as may be desired. Means are also provided for cutting down the flow of liquid so that both flat and cone shaped sprays may be made as small as desired.

Best results are attained by operating at from sixty pounds up. It is light in weight and comfortable in balance to the operator's hands. A serrated opening in the air nozzle acts as a guide for centering correctly with the fluid nozzle at all times. Another feature of this gun is that there will be no material collected on the air nozzle from a back lash, and the Eureka people emphasize the fact that this sprayer shows very little feathered edge.

EUREKA NO. 44 SPRAY GUN

A control valve member is available for reducing air pressure when there is the necessity for doing so.

EQUIPMENT AND SUPPLY CATALOGS

Erie Steel Rolls. Blake and Johnson Company, Waterbury, Conn.

Men and Methods. Ferro Enameling Company, Cleveland, Ohio.

Rockwell Oil and Gas Burners. W. S. Rockwell Company, New York.

American High Speed Fans. American Blower Company, Detroit, Mich.

Porcelain Enameling. Ferro Enamel Supply Company, Cleveland, Ohio.

National Metal Trades Association. History and scope of this organization.

Pebble Mills. Patterson Foundry and Machine Company, East Liverpool, Ohio.

Bob's Burning Bar Booklet. Ferro Enamel Supply Company, Cleveland, Ohio.

Mechanical Equipment for Electro-Plating and Galvanizing. Meaker Company, Chicago, Ill.

"Can We Compete Abroad." By C. C. Martin. Published by the National Foreign Trade Council.

C-E. Unit System for Burning Pulverized Fuel. Combustion Engineering Corporation, New York.

Drying and Heating by the Aid of Oehm's Heating Element. International Processes, Ltd., London, England.

Polishing Wheels. New Catalog No. 8. Advance Wheel Manufacturing Company, Inc., 618-622 West Lake street, Chicago, Ill.

Harvard Advertising Awards. Graduate School of Business Administration, George F. Baker Foundation, Harvard University, Cambridge, Mass.

Cadmium. Why it prevents rust; salt spray tests; chemical properties; physical properties; electrical properties; special tests and other information. Udylite Process Company, Kokomo, Ind.

General Electric Publications. Direct Heat Electric Furnaces; Automatic Starters for Slip Ring Induction Motors; Synchronous Motor and Condenser Panels; Automatic Reduced Voltage Starters for Synchronous Motors; Drum Type Controllers; A-c. Switchboards; Manual Contactors; Switchboards with Oil Circuit Breakers; Distribution and Small Power Transformers; Outdoor Station Equipment; D. C. Generators and Exciters.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

HEADQUARTERS, 140 SOUTH DEARBORN STREET, CHICAGO, ILL.

The program committee announces its tentative program of papers for the Detroit meeting. A splendid array of papers of authors of international reputation has been secured and foundry executives, foremen, metallurgists, and others attending the thirtieth annual meeting of the A. F. A. are assured of the most valuable program of technical papers ever gathered together by the Association. Special sessions for non-ferrous and steel foundrymen will be held the first three days of the week.

Preprints of papers will be distributed well in advance of the meeting in order that they may be read and that members may come prepared to discuss the many points raised. Following the policy of the past two years, authors will present their papers in abstract, leaving the greater part of the time of the session for general discussion.

TENTATIVE PROGRAM ON METALS

MONDAY, SEPT. 27

Session No. 2—3:00 p. m. **Non-Ferrous Metals.**
Joint Meeting of A. F. A. and Institute of Metals Division.
Constitution of Aluminum-Zinc-Tin Alloys and Aluminum-Zinc-Cadmium Alloys, by Dr. V. Jares, Technical School, Prague.—Exchange Paper of Czecho-Slovak Foundry Association.
Aluminum-Alloy Permanent Mold Casting, by Dr. R. J. Anderson, Cleveland, Ohio.

Session No. 3—3:00 p. m. **Materials Handling.**
Materials Handling in a Foundry, by E. T. Bennington, Cleveland Crane & Engineering Company, Cleveland, Ohio.
Saving Foundry Materials Handling, by H. J. Payne, The Society for Electrical Development, New York, N. Y.

Session No. 4—3:00 p. m. **Core Binders and Cores.**
Core Oil Specifications, by V. A. Crosby, Studebaker Corporation, South Bend, Ind.
Core Binders Investigation, by H. L. Campbell, University of Michigan, Ann Arbor, Mich.
Core Sand Mixture Tests, by C. A. Hansen, General Electric Company, Schnectady, N. Y.

TUESDAY, SEPT. 28

Session No. 6—10:00 a. m. **Temperature Determination in the Non-Ferrous Foundry—A Symposium.**
Joint Meeting of A. F. A. and Institute of Metals Division.
A. A. Grubb, Ohio Brass Co., Mansfield, Ohio.
H. M. St. John, Detroit Lubricator Co., Detroit.
Kirtland Marsh, Aluminum Co. of America, New Kensington, Pa.
R. R. Clarke, General Electric Co., Erie, Pa.
Representative, U. S. Bureau of Standards, Washington, D. C.
A. S. Hall, Thwing Instrument Co., Philadelphia, Pa.
R. D. Bean, Brown Instrument Co., Philadelphia, Pa.

Session No. 7—10:00 a. m. **Apprentice Training.**
Discussion of Apprentice Training.

Session No. 8—12:15 p. m. **Round Table on Brass Foundry Topics.**
Luncheon meeting and informal discussion.
Joint Meeting of A. F. A. and Institute of Metals Division.

Session No. 9—2:00 p. m. **Permanent and Long Life Molds—A Symposium.**
J. E. Hurst, Newton, Chambers & Co., Ltd., Sheffield, England.
H. A. Schwartz, Cleveland, Ohio.
Leon Cammen, The American Society of Mechanical Engineers, New York.
S. M. Udale and H. P. Kimber, The Holley Carburetor Co., Detroit, Mich.
James A. Murphy, Hamilton, Ohio.
Dr. Richard Moldenke, Watchung, N. J.

WEDNESDAY, SEPT. 29

Session No. 14—10:00 a. m. **Casting Nickel Alloys.**
Meeting of Institute of Metals Division, A. I. M. E.

Session No. 15—2:00 p. m. **Foundry Costs.**
Discussion of general needs for foundry cost methods and exposition of a specific foundry cost system for practical use.

Session No. 16—2:00 p. m. **Foundry Refractories.**
Report of the Chairman of the Joint Committee on Foundry Refractories.
Report of sub-committee on Testing and Specifications.
Report of sub-committee on Standardization and Simplification.
Discussion of Foundry Refractories.

THURSDAY, SEPT. 30

Session No. 17—10:00 a. m. **Foundry Sand Control.**
Reports of sub-committees of Joint Committee on Molding Sand Research.
Discussion of methods for practical shop control of foundry sand conditions.

Session No. 21—2:30 p. m. **Elimination of Waste in the Foundry Industry.**
Discussion of Possibilities of Elimination of Waste.
Report of Committee on Pattern Equipment Standardization.
Report of Committee on Corrosion of Metals.

FRIDAY, OCT. 1

Session No. 22—10:00 a. m. **Foundry Sand Control.**
Metallurgical Control of Foundry Sands, by L. B. Thomas, Fairbanks Morse Co., Beloit, Wis.
Grading Foundry Sands, by C. A. Hansen, General Electric Co., Schenectady, N. Y.
Foundry Sand Control, by O. E. J. Abrahamson, American Radiator Co., Buffalo, N. Y.

BRASS MANUFACTURERS ASSOCIATION

HEADQUARTERS, CITY HALL SQUARE BUILDING, CHICAGO, ILL.

The National Association of Brass Manufacturers concluded a very successful four-day convention at the Edgewater Beach Hotel on Friday, July 2.

Among the more important matters handled by the Association was endorsing the trade school system in the plumbing line, which is sponsored by the National Trade Extension Bureau, in a general way, and the conclusion was reached that worthy trade schools

would be supplied an assortment of cut-out materials in the plumbing line for their use in advancing the cause of the young man in learning the trade.

The Association voted on vitreous china lavatories that faucet hole opening's thickness should be 1¼", which is in keeping with the standard adopted by the Bureau of Standards of Washington, D. C., May 12, 1926. A further request was if manufacturers required the china made thicker at the point in question, that the same be recessed at the lower side. This provision was made so that the standard adopted by the National Association of Brass Manufacturers would accommodate the 2¼" shank, which would not inconvenience the contractor and plumber.

The thickness on enameled and earthenware of minimum size that the opening be 1½", the maximum 1⅞", in order to enable the brass manufacturers to standardize their products and give better installation.

The finishing touches were placed upon the Official Catalog that will come out the first of January, next. Reports indicated that the quota ordered was pretty well subscribed for and decided now, as heretofore, that no lists would be furnished in advance of the issuing of the book on January 1.

The Shower & Bath Division took some forward steps in the unification of features for the installation of bath and lavatory fixtures.

A resolution of sympathy was passed in reference to the death of Fred Hoffman, Jr., one of the twin sons of Fred Hoffman, President of the Hoffman & Billings Company, of Milwaukee, Wisconsin.

Cost Committee was appointed to go into the matter of costs, consisting of Messrs. H. C. Bulkeley, Illinois, Chairman; Chas. Muend, Pennsylvania; B. T. Hain, Illinois.

The next meeting will be held in Cleveland, Ohio, September 15, 16 and 17.

NEW YORK BRANCH, A. E. S.

HEADQUARTERS, CARE OF J. E. STERLING, 2505—45TH ST., ASTORIA, L. I.

The July meetings of the New York Branch of the American Electro-Platers' Society were well attended, even though we had considerable heat on the days of our meetings. Mr. Sterling, one of the delegates to the A. E. S. convention held in Newark, gave a most complete report on the convention. A committee headed by Mr. Voss is working on the branch's annual shore dinner to be held some time in September. The exact date and place will be made known as soon as the committee completes the plans. A good time is in store for those who attend.

Our president, Franklyn MacStocker would like to see some of the old-timers come to the meetings more often.

The June meetings of the New York Branch of the American Electro-Platers' Society were well attended. The new officers were installed by Joseph Down with appropriate ceremonies, after which the new president Franklyn MacStocker took the chair. He asked for co-operation from all the members to make his administration a success by attending all the meetings. He has planned to start all meetings at 8 P. M. promptly, so that they will terminate early and leave plenty of time after the meeting for conversation and shop talk.

The branch decided to meet throughout the summer so as not to interrupt the good work that is being done by the members.

LIGHTING EQUIPMENT ASSOCIATION

HEADQUARTERS, 424 GUARANTEE TITLE BLDG., CLEVELAND, O.

At the recent Annual Meeting of the National Council of Lighting Fixture Manufacturers held at Windsor Hotel, Montreal, Canada, the organization unanimously voted to change the name of the Association and hereafter it will be known as:

"Artistic Lighting Equipment Association."

New By-Laws, Code of Ethics and Fair Trade Practices were unanimously adopted, and the recommended Four-Year Co-operative Advertising and Merchandising Program was unanimously approved.

Supplementing these activities, a National Exhibition will be held yearly where all that is best in lighting equipment may be seen under one roof. This Exhibition will be open to Dealers, Jobbers, Builders, Architects, Interior Decorators and all allied industries as well as the public, and will be a permanent institution.

It was unanimously decided to hold the National Exhibition under the auspices of the Artistic Lighting Equipment Association at the Hollenden Hotel, Cleveland, Ohio—Jan. 31 to Feb. 5, 1927, inclusive.

The following officers were unanimously elected: President, Fred F. Farmer, Beardslee Chandler Manufacturing Company, 216 S. Jefferson St., Chicago, Ill.; vice-president, J. Wm. Schulze, Alfred Vester Sons, Inc., Providence, R. I.

G. P. Rogers, who recently made a trade survey of the industry for the organization was permanently appointed Managing Director of the Association, and H. B. Garrett, former Secretary, was made Assistant to Managing Director.

Personals

RAYMOND H. SULLIVAN

Raymond H. Sullivan, consulting engineer of New Britain, Conn., started in 1903 to serve his time as apprentice machinist with C. B. Cottrell & Sons' Company, Westerly, R. I. Upon completion of his apprenticeship he went out as a toolmaker, working with various companies, until 1911, when he entered Pratt Institute, graduating in industrial and mechanical engineering in 1913. During his second year he assisted in teaching machine design to the evening classes.

RAYMOND H. SULLIVAN

From there Mr. Sullivan went to the Yale-Towne Manufacturing Company, Stamford, Conn., and was with them during the war. He was made Superintendent of Munitions and War Work. After the war the position of Superintendent of Methods was created, organized and operated under his supervision. He was responsible for mechanical methods throughout the works until 1922 when he resigned to join the North & Judd Manufacturing Company in New Britain, Conn., as Vice-President.

Mr. Sullivan resigned from this company in March, 1926, having been in charge of manufacturing for three years. He is now engaged in consulting work.

WILLIAM H. BARR ORGANIZES FOUNDRY

The firm of William H. Barr, Inc., Buffalo, N. Y., has been organized to do a general brass foundry business. Mr. Barr was formerly president of the Lumen Bearing Company, also of Buffalo.

Mr. John C. McCallum, a production engineer of wide experience, will serve as general superintendent.

A foundry has been secured with about 20,000 square feet of floor space, and will be in full operation by August. They propose to melt with Monarch-Rockwell low pressure, oil-fired furnaces, in addition to oil-fired pit furnaces for special output. The equipment of molding machinery, sand blast, cranes, etc., is of the latest design. They are particularly interested in production of tonnage. The sales staff will cover the industrial states east of the Mississippi.

Ivan Stewart Forde, who, for a number of years, was manager of the Small Turbine Division of the Westinghouse Electric & Manufacturing Company, and for the past three years manager of the Sales Promotion Department of the Diamond Power Specialty Corporation, has resigned to be-

come affiliated with the Furnace Engineering Company, manufacturer of the Simplex unit pulverizer, as sales manager, with headquarters at 5 Beekman street, New York City.

Dr. C. B. Thwing, president of the Thwing Instrument Company, Philadelphia, Pa., is abroad and expects to tour Italy, Switzerland, Germany, Holland, Belgium, France, England and Scotland, in the next three months.

Charles S. Orne has been appointed manager of the Central Steel & Supply Company, Railway Exchange Building, Chicago, Ill., Western representative for Ross-Tacony Crucible Company. Mr. Orne is assisted by I. R. Robinson.

W. M. Corse, metallurgist, is in England. The primary object of his trip is to close negotiations for the American rights for the Durville patent for pouring Monel metal, aluminum bronze and other similar alloys. In addition, Mr. Corse will visit the National Physical Laboratory, Teddington, England, and other scientific institutions of Great Britain. He will attend the Institute of Metals meeting at Liege, Belgium, September 1 to 4 inclusive. Mr. Corse has been appointed representative of the Institute of Metals of Great Britain, of which organization he is honorary corresponding secretary for the United States, to the International Foundrymen's Congress which will meet at Detroit, September 27 to 30.

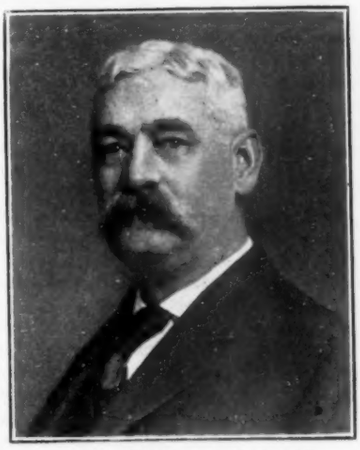
R. J. Tiedeken has been appointed raw material salesman in the Philadelphia territory by Bridgeport Brass Company, Bridgeport, Conn. Mr. Tiedeken is familiar with the manufacture and sale of brass goods, having been initiated into the business in 1903, at which time he became employed by the A. P. Swoyer Company, with whom he stayed in various capacities until 1921. Later he joined the U. T. Hungerford Company, representing them in Philadelphia for a short period. After leaving them, he became connected with the Carey-McFall Company, with whom he stayed until joining the Bridgeport Brass Company. Mr. Tiedeken will make his headquarters at the Philadelphia office of the Bridgeport Brass Company, which is located in the Bankers Trust Building.

The Metal & Thermit Corporation announces the addition of **R. R. Danielson** as director of research in its Ceramic Department. Mr. Danielson was born in Chicago, Ill., in 1892, and was graduated from the Crane Technical School in 1910. In 1914 he was graduated from the University of Illinois with degree of B.S. in Ceramic Engineering, and took a post-graduate course, securing the degree of M. S. in Ceramic Engineering 1916. In 1914-1916 we was instructor in Ceramic Engineering, University of Illinois; from 1916-1919, Ceramic Engineer, Royal Enameling Company and Benjamin Electric Company, Desplaines, Ill., and from 1919-1920, Enamel Technologist, U. S. Bureau of Standards, Washington, D. C. From 1920-1924 he was chief of the Enamel Division of that bureau. From 1924 until June 1 of this year he was Ceramic Engineer for the A. J. Lindemann & Hoverson Company of Milwaukee, Wis. Mr. Danielson has been active in the work of the Enameled Metal Division of the American Ceramic Society since its inception.

Obituaries

NATHANIEL STOW HART

Nathaniel Stow Hart was born in Roxbury, Mass., December 9, 1853. He prepared for college at the Roxbury Latin School and graduated from Harvard University in the class of 1875. His connection with the metal industry dates from the time he entered the employ of F. L. & J. C. Codman, Boston, Mass., with whom he was associated for some years. He left their employ in 1908 and in April, 1909, became associated with Divine Brothers Company, Utica, N. Y., serving them faithfully up to the time of his death. His oft-expressed wish to "die in harness" was granted him as he was taken ill in Bridgeport on June 16, came home on June 17 and passed away on June 20. He was a cheerful companion, a faithful associate and a loyal friend. He leaves a widow, Nellie Spaulding Hart, whom he married in 1903, and a son, Chester, by a former marriage.



NATHANIEL STOW HART

COLONEL WASHINGTON A. ROEBLING

Colonel Washington A. Roebling, president of the John A. Roebling's Sons Company, and builder of the Brooklyn Bridge died at his home at Trenton, N. J., July 21. He was 89 years old and infirmities of age were responsible for his death. He is survived by his widow and one son, John A. Roebling, of Bernardsville, N. J. Colonel Roebling had been in poor health for some time.

Colonel Roebling was the son of John Augustus Roebling, an engineer, who was a pioneer in modern methods of bridge building. The former was president of the Roebling Company when it was incorporated in 1876, later relinquishing this post and only taking up the presidential duties in later life. Colonel Roebling was born in Sasonburg, Pa. His father was a native of Prussia and was a civil engineer. The son was graduated from the Rensselaer Polytechnic Institute, Troy, N. Y., in 1857. He came to Trenton, where he received most of his schooling. The younger Roebling's first engineering work was done on the Allegheny Suspension Bridge.

While this work was in progress the Civil War broke out and the son enlisted. On April 16, 1861, the day after Fort Sumter was bombarded, young Roebling joined a Trenton regiment. He remained in the army until the war ended, being first assigned as a lieutenant in the engineers' corps. In 1869, after the death of his father, Colonel Roebling took up his residence in Brooklyn in order to give his time to construction of the famous bridge. He personally assisted in stringing the slender threads of wire. He was an invalid as a result of injuries sustained during the sinking of the caisson.

Colonel Roebling was a generous giver to numerous charities.

WILLIAM HOWARD TIMS

As we go to press, word comes of the death of William Howard Tims, for a number of years superintendent of the Abbott Ball Company, Hartford, Conn., and since January 1, 1926, general manager of that company. He died on July 17, 1926.

WILLIAM E. WALLACE

William E. Wallace, treasurer of Hendricks Brothers, Inc., New York. Mr. Wallace died on Saturday, July 10, 1926, at his home in East Orange, N. J., after an extended illness. He was 67 years old.

Mr. Wallace had been with Hendricks Brothers, Inc., for 26 years. He leaves a wife and three children.

WILLIAM A. LANGSENKAMP

William A. Langsenkamp, aged 55, president of the Langsenkamp-Wheeler Brass Works, Indianapolis, died at his home, 3335 Washington boulevard, recently, death resulting from a complication of diseases.

Mr. Langsenkamp was born in Indianapolis, January 9, 1871, and had been a resident of the city all his life.

With his brother he entered the brass and finishing business in Indianapolis in 1895, the firm being known as Langsenkamp

Brothers' Brass Works. In 1905 the company was incorporated under the name of the Langsenkamp-Wheeler Brass Works, and, since the death of F. H. Wheeler, Mr. Langsenkamp had been president of the company.

He was a member of the Columbia Club, the Indianapolis Athletic Club, the Indianapolis Maennerchor and the American Institute of Metallurgical Engineers.

The surviving relatives include the widow, who was Miss Ida Brandt before her marriage; two sons, Russell and Harold, both of Indianapolis, and the mother, Mrs. William Langsenkamp. The father, who has been dead eight years, came to Indianapolis in 1854 and engaged in the manufacture of copper articles, one of the first metal working industries of the city.

E. GEORGE LAVINO

E. George Lavino, member of the firm of E. J. Lavino & Company, Bullitt Building, Philadelphia, Pa., manufacturers of ferro-manganese and dealers in other alloys, died on June 27 at his home in a suburb of Philadelphia, Pa. His brother died a few months ago.

Mr. Lavino was a son of E. J. Lavino, head of the firm. He was born in Smyrna, Asia Minor, and came to the United States when a child. He was a graduate of the University of Pennsylvania, and was forty-five years old at the time of his death.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

AUGUST 2, 1926

The family of the late **A. B. Seelig**, who for many years was secretary of the **Chase Companies, Inc.**, have received a copy of resolutions of condolences adopted by the directors of the **T. E. Conklin Brass & Copper Company**, of New York, on Mr. Seelig's death. At the time of his death he was vice-president and general manager of the Michigan Copper & Brass Company.

The bursting of a water pipe resulting in a claimed damage of $23,000 to finished stock and raw materials has resulted in a suit for this amount by the **Patent Button Company**, of this city, against the **Barney-Ahlers Construction Company**, of New York. The latter company was the general contractor on the factory's new building and **M. J. Daly Sons Company** was one of the sub-contractors. The Button company has withheld the final payment of $40,000 to the New York firm for constructing the building so the latter concern has brought suit against the local factory for that amount. It asks to be relieved of any liability for the bursting pipe on the ground that if negligence resulted it was the fault of the sub-contractor, the Daly company. The Barney-Ahlers company is also withholding $5,000 due the Daly company until the courts fix the responsibility.

Judge E. C. Dickenson, in the Superior Court, last month, ordered judgment entered for **Mrs. C. Biedrezki** against the **Farrel Foundry and Machine Company** for the amount of $3,000, compensation for her husband's death. This sum had previously been awarded by the compensation commissioner, the company appealed but the Supreme Court upheld the award of the compensation commissioner.

Judge Dickenson, last month, also awarded the **Sprague Electrical Company**, of this city, judgment of $975.39 against the **P. N. Laskas Trucking Company.** The Sprague company gave the Laskas company a cargo of wire and electrical fixtures to be conveyed to two radio companies in New York. The goods were lost in transit. The Laskas company claimed it was not a common carrier and so not liable but Judge Dickenson ruled that it was a common carrier, a decision which it is expected will act as a precedent in future cases of the kind.

Luther Bahney, metallurgist of the **Scovill Manufacturing Company**, addressed the Kiwanis Club at its meeting, July 7, on the industrial problems New England has to face and the work that is being done by the New England conference to remedy them. One of the chief troubles is that New Englanders and New England industry are too complacent and must be shaken out of this attitude of mind, he said. A program of information bureaus and mediums for advertising the region must be started. The region is too modest in advertising its industries, he said, pointing out that most of the large local firms have no signs attached to them which can be seen by visitors and those who pass through by train or auto.

E. W. Goss of the **Scovill Manufacturing Company** and representative of Gov. John Trumbull on the New England Governors' Coal Commission, appeared before the Interstate Commerce Commission at Atlantic City, last month, in support of New England's plea for a reduction in the freight rates on coal from the mines to this region. Freight rates on coal for these states are, proportionally, far higher than for other sections, he said, which amounts to unfair discrimination against this region.

Manufacturers of Waterbury are urged to make larger use of the Connecticut offices of the Department of Commerce in a letter to the local Chamber of Commerce from Director Klein of the Foreign and Domestic Commerce Bureau of the Department of Commerce. Cooperative offices of the Department of Commerce are maintained in connection with the Bridgeport and New Haven Chambers of Commerce.

Shipments of the **American Brass Company** for the first half of 1926 are 14 per cent greater than for the first half of 1925, it is learned. The shipments for the first half of this year are also 30 per cent greater than for the first six months of 1924. Orders on the books of the American Brass Company and the Anaconda's Great Falls wire and rod mill, July 1, 1926, are as large as they were July 1, 1925.—W. R. B.

BRIDGEPORT, CONN.

AUGUST 2, 1926

The **Bridgeport Brass Company** won first prize for "the best use of art in industrial advertising," at the fifth annual convention of the **National Industrial Advertisers' Association**, held in Philadelphia June 19 to 24. The prize was a Maxfield Parrish painting entitled, "The Spirit of Transportation," offered by Ezra Clark of the Clark Trucktractor Company, of Buchanan, Michigan. The Rome Wire Company, of Rome, N. Y., won second prize. There were 137 concerns who had advertising exhibits. The local concern had on display a number of enlarged, framed pictures of advertisements in the historical series which they are running currently in the trade papers. These ads had been selected from their plumbing, railroad and general series and were attractively tinted by artists.

The **Jenkins Brothers Company** is protesting to the city government against its taxable assessment, claiming too high a value has been placed on it. The company claims that the error is due to the purchase by it some time ago of one of the Crane Company plants. **Charles V. Barrington**, vice-president of the company, declares the concern has been placed in a false light by the appeal for abatement and wishes it made plain that the company is not in any way a tax dodger and has not sought for or received any unjustified consideration. An accountant, employed by the company, made an error in the assessed value of the company for taxation and an abatement was granted by the common council but now this form of abatement has been declared illegal by the courts. This is forcing the company to pay a large sum of money which experts for both the city and company agree was assessed in error.

The **Fairfield Works** of the E. I. DuPont deNemours Company is to be self managing and entirely separated from all divisions of the company beginning this month. Up to now the plant has been managed from Newburgh, N. Y., and was a part of that division. The business has increased so much that two additions have been built here, and it has now been decided to operate the plant as an independent unit. **Ernest R. Cathcart,** who has managed the local plant, will be in full charge with respect to purchases, production and sales.

George **B. Clark,** receiver of the **Gaynor Manufacturing Company,** has been granted authority by Judge Alfred C. Baldwin to pay $2,352 from the firm's assets to the town of Stratford on taxes due on the personal property of the company for five years from 1920. The judge has also authorized Receiver Clark to institute suits to collect $14,144 from some of the former owners of the company.

The **Singer Manufacturing Company** provided a float depicting the signing of the Declaration of Independence in the municipal celebration July 5th of the 150th anniversary of the signing.—W. R. B.

TORRINGTON, CONN.

AUGUST 2, 1926

With the shops observing their annual shutdowns for inventories and repairs, this has been a quiet month in Torrington. Conditions are good for the slack season, however, and a spirit of optimism prevails in manufacturing circles. The tremendous amount of building which has been in progress here since the first of the year is assurance of continued prosperity. Reports based on a recent survey show that building operations in Torrington during the first half of 1926 were double the total for the corresponding period of last year. A considerable proportion of these operations involved factory expansion.

Highly gratifying to Torrington people was the announcement this month that Uri T. Hungerford, who died in June, had provided in his will for a bequest of $500,000 for the Charlotte Hungerford Hospital, which he founded here during his life time as a memorial to his mother; and that in addition to this outright bequest the hospital was to receive eventually three-quarters of the residue of his estate, variously estimated from $2,000,000 to $8,000,000. The hospital ranks as one of the best equipped of its size in New England, and conforms with all the standards of the American College of Physicians and Surgeons.

William Clark, aged 59, former treasurer of the Union Hardware Company, died July 15 in a hospital at Newburgh, N. Y., where he had been a patient for three days. Death followed a long period of ill health. Mr. Clark was born in Scotland and came to this country at the age of 21. He entered the employ of the Union Hardware Company as a bookkeeper 20 years ago and later became chief accountant. Five years ago he was elected treasurer but submitted his resignation last August to take effect January 1. He is survived by one son, one daughter, his father and three sisters.—J. H. T.

NEW BRITAIN, CONN.

AUGUST 2, 1926.

There appears no noticeable let-up in the concerns of this city and except for a day's shutdown due to excessive heat the month has seen steady business and the outlook for the fall is the same. The **American Hardware Corporation** in all its branches is kept fairly busy on current orders without manufacturing to fill stock.

The directors of the now defunct **Traut & Hine Manufacturing Company,** which plant was purchased by the **North & Judd Company** several months ago, have voted to distribute to the stockholders $2.25 per share as a second liquidation dividend in dissolution proceedings.

The **North & Judd Manufacturing Company,** concerning the managing personnel of which there had been many rumors for several months, at its annual meeting this month made no radical changes. **Frederick M. Holmes** was re-elected president and **Clarence F. Bennett,** president of the **Stanley Works,** was added to the board of directors. The other officials of the concern re-elected are: **E. M. Wightman,** vice-president and secretary; **George Traut,** treasurer and assistant secretary; **Samuel McCutcheon;** assistant treasurer, **F. J. Ward.**

Landers, Frary & Clark continues busy in its various branches and is especially so in its aluminum lines and electrical equipment department.

Business here, if not booming, is at least very satisfactory and a survey shows no reason to think the fall and winter will find any change.—H. R. J.

PROVIDENCE, R. I.

AUGUST 2, 1926.

True to traditions and customs, the month of July has been one of general business cessation, especially in the metal trades, for at least one or two weeks according to individual conditions. There is, however, a material optimism that is especially encouraging, foretelling the most improved industrial activity experienced hereabouts in several years. Both the building trades and the manufacturing jewelry branches show healthy indications of particular activity and with these busy, the co-ordinate and dependent lines are certain to reflect the improved conditions. At no time since the beginning of the World War, more than a decade ago, has the jewelry industry given such promise as at present. The placing of orders for the fall and holiday trade during the opening days of the month, was almost phenomenal, causing a more general overhauling of plants and a greater demand for workmen. So, too, with the building trades. There is no necessity for a good workman to be unemployed. Several large projects in the building lines that are underway, with a number of others under contemplation, or being figured, are prophetic of a busy period that will continue for the remainder of this year, at least.

From plans of their own engineers, the **Brown & Sharpe Manufacturing Company,** have awarded the contract for an addition to the boiler house at its plant on Premenade street, Providence. It will be approximate 42 by 25 feet and 40 feet in height.

The **Ideal Foundry Company** is having a new foundry building erected on Public street, Providence, about 40 by 80 feet and entirely of brick.

Heller & Company, Inc., have removed their manufacturing jewelry establishment from 36 Garnet street to more commodious quarters at 116 Chestnut street.

The Rhode Island Wire Works, Inc., 45 Willard avenue, have the contracts for hollow metal elevator fronts for the new building of the **Kane Furniture Company** at Worcester.

New England Lacquer Company of Providence has been granted a charter under the laws of Rhode Island for the manufacture of lacquers, etc., with a capital stock of $20,000. consisting of 150 shares of common at $100 each and 50 shares of preferred at $100 each. The incorporators are Malcolm D. Champlin of East Providence and Thomas A. Jenckes and Stephen H. Jenckes.

Judge Arthur L. Brown in the United States District Court here, on July 28, entered an opinion denying and dismissing the patent infringement petition of the **Cartridge Machinery Company,** the **Metallic Shell & Tube Company** and the **Mechanical** and **Chemical Equipment Company** against the **National Collapsible Tube Company,** 362 Carpenter street, Providence. In their petition, the plaintiffs charge the defendant with infringing on four patents by making closed end tubes, through the method of extruding metals, a process which they claim is their own by virtue of a patent granted to a Mr. Hopper. Judge Brown, in his opinion, said that the defendant had embodied no novel mechanical device or combination in their machinery and no knowledge of the art of extruding metals which originated with Hopper. A draft decree was ordered presented to the court.

The **Kleiner-Newman Company** of Providence has been incorporated under the laws of Rhode Island to manufacture and deal in jewelry with a capital consisting of 500 shares of common stock without par value. The incorporators are Morris D. Newman, Charles Kleiner and Maurice Robinson.

Flint-Blood Corporation has been granted a charter under the laws of Rhode Island to manufacture jewelry in Providence with an authorized capital of 500 shares of common stock without par value. The incorporators are Maurice Robinson, Charles M. Robinson and David C. Adelman.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

AUGUST 2, 1926

This is the season of inventories and vacation periods, and these conditions apply to Rochester as well as to other cities. In consequence, business activities are not marked as in previous months, but it is true that there is considerable more production and more workmen are employed in Rochester's metal-using plants than a year ago at this time.

Reduced production is reported in some large manufacturing plants about the city, but these conditions are seasonal. All of the local brass foundries and independent electro-plating plants are very active at this time, hardly a brassworker or moulder in the city being idle. Much of the work turned out by these concerns is of a local nature—for building purposes.

Men of authority in the metal trades do not anticipate an improvement in general business conditions until the summer season has ended. They say indications point to much improvement in September or October.—G. B. E.

NEWARK, N. J.

AUGUST 2, 1926

Milton J. Finkelstein has been named receiver for the **Woodland Screen Company,** Newark, while **Nicholas La Vecchia** was appointed custodian receiver of the **Riordan Plumbing Supply Company,** of 7 Passaic Street, Harrison, N. J. The appointment was made upon application of a creditor of Evansville, Ill. Owners of the company express the belief that with a custodian receiver in charge arrangements can be made to pay creditors in full and save something for stockholders. Assets are said to be $35,000 and liabilities $30,000. Nevertheless, it is said, the concern cannot meet its current obligations, has several judgments against it and some of its property has been sold to satisfy one of them.

Civil suit has been instituted in the United States District Court at Trenton by **Max Yablick**, of Newark, against the **Protecto Safety Corporation,** of Newark. The plaintiff claims that a patent held by him on a certain type of safety helmet used for the purification of air containing ammonia granted last November has been infringed upon by the defendant company. The helmets are worn by firemen. The defendant company, in filing an answer claims that the helmet has been in operation since 1915, and that copper sulphates have been used to purify air containing ammonia for more than ten years.

The **Kanster-Hamburg Co.,** of Newark, has been incorporated at Trenton with $50,000 capital to manufacture metal products. The **Roto Company** has been chartered with $100,000 capital to manufacture tools, etc. **Consolidated Research Laboratories** were chartered with $100,000 capital to manufacture radio supplies. **Newark Electrical Supply Company** has been chartered with $300,000 capital to deal in electrical supplies.—C. A. L.

TRENTON, N. J.

AUGUST 2, 1926

Metal concerns here report business as being on the increase and it is expected that the early fall trade will be much better. While the companies here are busy in some lines, orders for other products are not up to expectations.

At a special session held before Federal Judge William N. Runyon in the United States District Court, application was made for the appointment of two receivers to act for the bond holders of the **Jordan L. Mott Company.** The applicant, representing the Guaranty Trust Company, which recently filed a bill of foreclosure against the firm. It was recommended that the present receivers, Charles H. Baker and Robert K. Bowman, be retained in that capacity. Judge Runyon reserved decision in the matter. It was said that this action was but another step in the program for the complete reorganization of the Mott firm, which is in a flourishing condition at the present time and will continue in full operation while the adjustment of its business affairs are being carried on. The entire reorganization plan will be placed in the hands of the court shortly and submitted to each creditor for approval.

The bondholders are acting in harmony with the authorities in charge of reorganization and have agreed to accept new bonds for the old ones, so that no hitch in the plan is anticipated. It is believed that the affairs of the concern will be settled in a manner satisfactory to all interested in the matter at the hearing. It is then expected that the plant will be on a better working basis than at any time in its previous history.

Alleging that the **Trenton Hardware Company** is insolvent, to the extent that it is without ready cash with which to meet obligations, the First National Bank, of Trenton, has asked in a bill filed in the Court of Chancery that a receiver be named for the business. Chancellor Walker has ordered the company to show cause why the request should not be granted.

The **Schroeder Sheet Metal Works,** of Irvington, N. J., has been chartered here with $50,000 capital to deal in metal products, etc. **Service Electric Appliance Company,** of Trenton, was chartered with 1,000 shares no par to manufacture electrical appliances.—C. A. L.

PITTSBURGH, PA.

AUGUST 2, 1926

For the first six months of 1926, business conditions in the Pittsburg district were approximately 10 per cent better than the average for the past five years, judging from the payrolls distributed by the banks. The marked improvement in May and June brought this total up to such proportions after the first four months of the current year had fallen somewhat behind 1925 and preceding years.

Hardware trade is classed as fair. Lumber and building materials are selling slightly better, but construction work is under that of last year. Plumbing and heating equipment has been in stronger request. Electrical merchandise is fairly active, while radio equipment is dull. Mill and oil well supplies are in quite good demand, but mine supplies are inactive, due to the inactivity in the bituminous coal industries.

Railroad loadings as effecting the immediate Pittsburg district appear to be well balanced, as indicated from the loading reports of the various railroads centering in this vicinity.—H. W. R.

MIDDLE WESTERN STATES

CLEVELAND, OHIO

AUGUST 2, 1926

Gains in working forces were made last month in nonferrous metal shops and miscellaneous concerns, mostly electrical, according to the monthly employment survey of the Cleveland Chamber of Commerce.

The **Aetna Brass Manufacturing Company** was recently organized in Cleveland and incorporated with 500 shares at no par value. Incorporators are: L. G. Rosenblum, E. Rosenblum, John Wilson, Esther Sontag and E. Carter.

Two hundred shares of stock with no par value have been issued by the newly incorporated **Bellaire Electrical Appliance Company,** which will shortly open a plant at Bellaire, O., for the manufacture of brass electrical fixtures. Incorporators are: S. J. Watterson, John Robson, M. W. Watterson, A. T. Rolf and Edward Raferty.

An extra dividend of 25 cents on common shares of stock of the **Union Metal Manufacturing Company,** Canton, O., was paid last month in addition to the regular quarterly payment of 50 cents a share on the common and $1.75 on the preferred stock.

The Henry Furnace & Foundry Company, Cleveland, last month paid $1.75 on its preferred stock.

The first joint outing of the 5,000 employes of the **Ohio Brass Company,** Mansfield, and the **Ohio Insulator Company,** Barberton, was held July 31 at Chippewa Lake, O. In addition to usual picnic features the outing was marked by a baseball game between the Foremen's clubs of both plants. Music was furnished by the Ohio Brass band.—S. D. I.

DETROIT, MICH.

AUGUST 2, 1926.

It is announced that all the outstanding preferred stock of the **Edmunds & Jones Corporation** has been called for redemption at $120 a share, in line with plans for the proposed merger with the **C. M. Hall Lamp Company,** details of which are being worked out.

Rapid progress is being made in remodeling the plant of the **American Enamel Products Company** at Mt. Clemens, Mich. The structure formerly was that of the **Transport Truck Company.** Already more than $50,000 has been spent in new machinery.

The **Michigan Copper and Brass Company** has erected a new garage and service building on West Jefferson avenue. The architects were Lane, Davenport and Peterson, Detroit.

L. B. Young, formerly general manager of the **Michigan Stove Company,** who continued in the **Detroit-Michigan Stove Company** organization after the recent consolidation of those interests, has retired from the stove business. Mr. Young has been devoted to the Michigan Stove Company, having occupied positions from office boy to general manager, which he achieved in 1914 and continued to hold until 1925, when his company was consolidated with the **Detroit Stove Works.** Mr. Young proposes, it is stated, to take a good long rest after his long period in the harness, and thus far has made no new business arrangements.

Railroad tariffs became effective July 1, establishing revised rates on brass, copper and bronze ingots, pig and scrap and related articles, which increased the rate from Baltimore to Detroit from 22 to 28 cents per 100, effecting an important movement by reason of the majority of the smelting plants on the Atlantic Seaboard being located at Baltimore, at which place the metal is produced from the ore imported from foreign mines. It is stated the rates are the result of a proceeding before the Interstate Commerce Commission, which had before it the question of stabilizing the rates of these commodities within the eastern and central west territories. Many of the rates in this territory were depressed, it is stated, to a subnormal basis through competition many years ago. In the stabilizing process increases have been made between some points, but a number of reductions, it is claimed, have also been made in the leveling out process throughout the territory.

Beginning his career as office boy, now president of the company, **Edmund A. Morris,** of the **Detroit Lead Pipe Works,** manufacturers of lead pipe, and jobbers of plumbing and heating supplies, recently observed his fiftieth anniversary with his organization. There was no special program to mark the event, Mr. Morris coming down at the regular hour and attending to his regular duties. He declares he intends to keep right on the job until they carry him out. In addition to having served 50 years with his firm, Mr. Morris enjoys another distinction—that of having been the first president of the Central Supply association, an organization of manufacturers and jobbers of plumbing and heating supplies, to be elected for a second term.—F. J. H.

CHICAGO, ILL.

AUGUST 2, 1926

The **Garvey Furniture Company,** 137 North Wabash avenue, has been granted a charter by the secretary of state. The company was capitalized at $50,000, and will buy, sell, manufacture and deal in metal and wooden furniture of all kinds. The incorporators are Anita Sloan, Myer H. Gladstone, James O. Garvey, and the correspondent is Myer H. Gladstone, 134 North La Salle street.

Appliances, Inc., 20 West Jackson boulevard, has been granted a charter and capitalized at $5,000 to deal in and manufacture appliances or other commodities produced by other manufacturers. The company's incorporators are Robert L. Pearce, Charles S. Carpenter and Barnet L. Resset. The correspondent is Resset and Co., 20 West Jackson boulevard.

The **Northwest Cabinet Company,** 69 West Washington street, with a capital of $5,000, has been granted a charter to manufacture and deal in interior grill work, cabinet work and lumber. The incorporators are Myrtle Christensen, R. F. Cruickshank, Charles Christensen. The correspondent is Frank J. Tollkuehn, 69 West Washington street.

Imperial Motors Company, 3801-3 Fullerton avenue, with a capital of $15,000, has been chartered to manufacture and deal in automobiles, automobile accessories and supplies, etc. Incorporators are R. M. Perbosner, Sign J. Klein and Albert Hart. The correspondent is Ruckberg and Burr, 111 West Monroe street.

The **Loxure Corporation,** 10 North Michigan avenue, has been authorized by the secretary of state to manufacture and deal in hardware specialties. The company was capitalized at $5,000, and its incorporators are Harry W. Ackerman, M. Axelman and Anna K. Ackerman. The correspondent for the company is J. Glen Jacobs, 38 South Dearborn street.

The **Republic Electric Company,** 1772 Wilson avenue, has been capitalized at $20,000 to manufacture and deal in goods, wares and merchandise, apparatus, devices, electric or otherwise systems and methods adapted to or capable of being used in connection with the reception or transmission of communications, telegraphic, telephonic or otherwise. The company has been granted a charter by the secretary of state, with the following incorporators: John M. Klein, Jr., Matthew J. Deforest and Teresa Klein. The correspondent is Defrees, Buckingham and Eaton, 105 South La Salle street.

Bauer Body Corporation, 335 W. 28th Place, has been granted a charter and is capitalized for $25,000. They will manufacture and deal in motor truck and passenger bodies. The incorporators include Eleanor E. Bauer, Albert F. Bauer and Walfred H. Williams. The correspondent is A. F. Bauer, 7028 Sheridan Road.

The **Vacuum Can Company** has purchased the four-story brick building, 75 by 125 feet, which it now occupies, for a reported $85,000. The plant is at 19 South Hoyne avenue. Alex Friend and Company and Henry P. Mann were the brokers.—L. H. G.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

JULY 19, 1926

Although the coal strike has been in operation for a number of weeks, the Birmingham metal trades are maintaining operations, though with considerable restriction of output. The principal effect is apparent at the larger works, where heating on a large scale is essential. Tube makers have very good orders, especially for condenser tubes, which require quantities of raw fuel, particularly for annealing, and occasionally short time has to be worked, while the low quality of the fuel available threatens the maintenance of quality and adds a good deal to the cost of production. The large number of electrical plants ordered, especially by great municipalities, has brought numerous contracts to Birmingham for condenser tubes. The inability to supply these in sufficient quantities is causing much unemployment in different parts of the country through the holding up of constructional work.

One large works in Birmingham producing sheets and rods has lately installed eight additional oil furnaces for the production of copper rods. This has enabled the rate of production to be increased, and a number of additional workmen to be employed. Several furnaces were introduced during the last coal strike. Oil, however, is not regarded generally as an

economical substitute for coal. One typical calculation is that it compares with coal costing £2 5s a ton. In normal times best coal for industrial purposes does not reach anything like this value, but as equivalent fuel would cost £2 10s the change over is just worth making as an emergency measure.

The small metal trades have suffered very little from the strike, for the reason that no great quantity of fuel is used for melting, and, in numerous cases, the stampers and producers of small metal wares get all their power from the electrical corporation. Many stampers, since the increase in the demand for motors, have changed over from other products to the provision of parts for motor vehicles. Very large uses of brass constituents are made, as well as other non-ferrous parts, and, generally speaking, the manufacturers can produce these in sufficient quantities. Cases have arisen, however, where the operation of the double shift for manufacture has been discontinued.

The increasing popularity of metal windows is a feature of the building trade, some very large factory extensions having been made in Birmingham by companies specializing in this line. Shops have been built and further machinery introduced to cope with the demand. These windows are being utilized in many municipal housing schemes and in large factories and offices. In connection with housing extension the substitution of copper tubes for those of lead for the conveyance of domestic water has made great progress, and there are indications that this metal will be generally used for this class of work.

The annual report of the Birmingham Jewellers' and Silversmiths' Association shows a decrease in membership during the year from 515 to 499, accounted for by members either going out of business or making arrangements with their creditors. The jewelry trade is at present under a cloud, the demand for jewelry having been largely affected by the trade depression and the increased popularity of motoring, on which many people prefer to spend their money, rather than on articles of personal decoration. Some little revival has been noticed lately, but many jewelry shops have found a profitable side line in other metal production, one firm, for example, having changed over to manufacture of safety razors, which are being turned out in large quantities.

A bill is now before Parliament for the purpose of legalizing standard trade descriptions of rolled gold, gilt, and imitation jewelry, particularly defining the meaning of such terms as rolled gold, gold filled, gold shell, gold case and gilt. The bill passed its third reading last session, but was unfortunately deferred, and a new bill has had to be introduced this year. In spite of pressing political matters, it is hoped to get the bill through its final stages during the present session.

The Art & Technical School is still considered a great success, the work directed to the production of mountings of modern type having secured general commendation. The Association is preparing a booklet giving a full list of trade marks and trade punches and giving particulars of 10,000 marks registered by the Association, of which 5,000 are British and the balance French, Swiss, German and American.—J. H.

Business Items—Verified

American Boron Products Company, Inc., announces that its new plant is now completed at Ramsdell and Elmwood avenues, Buffalo, N. Y.

McGill Metal Company, Valparaiso, Indiana, has increased its capital stock from $200,000 to $300,000, said increase of $100,000 being in preferred stock. This firm operates a bronze foundry.

Keller Foundry Company, 1010 E. Jackson avenue, Knoxville, Tenn., has erected an addition for a brass foundry, which is now in operation. This firm operates the following departments: casting shop, grinding room.

Elgin National Watch Company, Elgin, Ill., plans to erect a four-story and basement factory addition, 28 x 500 ft.; also another addition, 40 x 90 ft. Cost estimated at $750,000. This firm operates the following departments: tool room, plating, polishing, lacquering.

American Bronze Corporation, Berwyn, Pa., manufacturer of bronze bars, brass and bronze bearings, has changed its name to the American Non-Gran Bronze Corporation. This firm operates the following departments: brass, bronze foundry, brass machine shop, tool room, grinding room.

The **Plumbago Crucible Association,** 90 West street, New York, announces that a statement made in its July advertisement in THE METAL INDUSTRY that the **Sloan Valve Company** melted 140,000 pounds of metal in one month, is in error. The total amount melted in one month this spring was 540,000 pounds.

The **Wisconsin Iron & Wire Company** of Milwaukee was awarded a contract for the ornamental iron, bronze, fire escapes and miscellaneous iron to be used in the National Press Building, a fourteen-story home and office building, being erected in Washington, D. C., by the National Press Building Corporation, for the National Press Club.

The **Reading Knob Works,** Gregg avenue, Reading, Pa., is having plans drawn for a new one-story foundry, 72 x 80 ft., primarily for brass casting service. C. L. Heizman is president. This firm operates the following departments: bronze foundry, brass machine shop, tool room, grinding room, casting shop, spinning, plating, japanning, stamping, polishing, lacquering.

C. G. Hussey & Company, Pittsburgh, Pa., have recently added to their plant a modern equipped plating department for nickel plating copper sheet. They will also do decorative work by the electro methods on copper sheet in panel form. The equipment has been installed under the personal supervision of **George E. Thompson,** specialist in his line, who takes over the entire charge of the plating department.

The **Electro-Sherardizing Company,** 1743 North Randolph street, Philadelphia, Pa., has been re-organized with new officers as follows: M. J. Greenhalgh, president; R. R. Robinson, vice-president, and H. Greenhalgh, secretary and treasurer. The company was incorporated in 1921, and specializes in dry galvanizing and polishing. It has a capacity of 30 tons per week. This firm operates the following departments: galvanizing, polishing.

G. L. Anderson Brass Works, Inc., Birmingham, Ala., has doubled its capital stock and is erecting a new plant which will be devoted to the casting of metals. This plant with new equipment will cost in the neighborhood of $15,000. Lloyd Johnson, formerly superintendent of the Joubert & Joslin Machine & Foundry Company, of that city, is now connected with this company as vice-president and in charge of plant operations.

Joseph M. Carson, W. I. Overstreet and E. H. Owen have established a brass foundry at 216 Columbia street, Portsmouth, Va., operating under the name of **Overstreet Sales Corporation.** This firm will operate the following departments: brass, bronze, aluminum foundry; brass machine shop; and will also be in the market periodically for aluminum, copper, brass, etc., including manganese copper, phosphor copper, tin, zinc, lead, etc.

The **Ohio Brass Company,** Mansfield, Ohio, has spent about $5,000 equipping a truck with a special body to carry and display a representative line of materials manufactured at the plant. The new truck is on a tour of the United States, Mexico and Canada, and is driven by Carl Burkhalter. In 1919 a truck was on display at the Ohio Brass picnic, and traveled a distance of 125,000 miles, visiting every state in the union and also parts of Mexico and Canada.

Fire, June 11, destroyed a portion of the plant of the Acme **Metal Goods Manufacturing Company,** Newark, N. J., occupying a portion of the building at Orange and Ogden streets, with loss reported at $25,000, a considerable portion representing machinery and stock. The loss will be replaced. Charles Fischer is one of the heads of the company. This firm operates the following departments: tool room, grinding room, plating, japanning, stamping, soldering, polishing, lacquering.

The **Dif Corporation,** which handles the household package goods department of the Magnus Chemical Company, 718

Atlantic avenue, Brooklyn, N. Y., announces the election of J. L. Johnston and John H. Mitchell to its board of directors. Mr. Johnston is a partner in Bond & Goodwin, an investment banking house of New York. Mr. Mitchell is the New York sales manager of the Barron G. Collier organization which controls most of the street car and subway advertising of the United States.

The **Strong Metal Products Company**, Cleveland, Ohio, has been taken over by Frank B. Rockliff, who has temporarily operated it as an individual, but it will be incorporated as soon as possible and in the future will be operated under the trade name of the **F. B. Rockliff Manufacturing Company.** Equipment has been moved to Wellington, Ohio, where the plant is now located. The company manufactures metal stampings. The following departments are operated: tool room, cutting-up shop, stamping.

North & Judd Manufacturing Company, New Britain, Conn., has purchased the saddlery hardware business of **August Buermann Manufacturing Company,** Newark, N. J., and will supply customers with a complete line of bits, spurs; especially drop forged, silver inlaid and Star silver grades and other goods. Entire stock together with all equipment for manufacturing is now being moved to New Britain. Temporarily these goods will be shown through the medium of August Buermann Manufacturing Company's catalog No. 35.

Hilo Varnish Corporation, Brooklyn, N. Y., has under construction a five-story building, 75 x 100 feet, on its vacant street corner, with an interior court, 40 x 45. The first floor will be entirely a shipping floor, with facilities for loading two trucks inside of the building off the street and two additional trucks just outside the building on the street. The second floor will be used entirely for storage and the three upper stories for the grinding department, doubling the present grinding space. As soon as these added facilities are in service, the firm expects to bring out a new lacquer finish.

The **Sigmet Metals Company,** 42 Broadway, New York, filed a certificate with the Secretary of State, to issue 1,000 shares of preferred stock, par value $100 each, and 375 shares of no par value common stock. This is to replace the old issue of 250 shares of common stock at $100 each. The company remains under the same management and there has been no change in the personnel of the board of directors, which is as follows: Samuel Siegel, president and treasurer; C. H. Brandes, director; D. Loewenthal, secretary. This company deals in metals as principals only and does not do any brokerage business whatsoever.

Industrial and Financial News

SILVER PLATE MISBRANDING

Issuance of eleven separate "cease and desist" orders directed to certain manufacturers of silver plated ware who have been found, the Federal Trade Commision states, to have indulged in the practice of misbranding of such wares, was announced July 15. This action was taken, according to the commission, "in a further effort to eliminate the practice of misbranding silver plated ware."

CEASE AND DESIST ORDERS

The announcement continues as follows:

The following concerns were specifically directed to discontinue using in connection with the sale of silver plated ware which was not made in Sheffield, England, the word "Sheffield" alone or in combination with any other word or words, sign, symbol or device to describe or designate such silver plated ware either by stamping or impressing the name "Sheffield" thereon or in any other manner: Ontario Silver Company, Muncie, Ind.; H. O. Rogers Silver Company, Taunton, Mass.; Superior Silver Company, Inc., Brooklyn, N. Y.; and Jacob Busch, Samuel E. Bernstein, Inc.; Hemill Silver Ware Company, and A. L. Wagner Manufacturing Company, the last four all of New York City.

The following two concerns in the commission's orders are required to discontinue the use of the word "Quadruple" alone or in combination with any other word or words unless the silver plated ware so designated has been coated or plated with silver four times, or has been given a single coating of silver equivalent in amount and quality to that formerly obtained by the application of four coatings: White Silver Company, Taunton, Mass., and Benedict Manufacturing Company, East Syracuse, N. Y.

In the case of the Keystone Silver, Inc., formerly Keystone Metal & Spinning & Stamping Company of New York City, the commission has directed that the respondent discontinue both practices of wrongfully using the word "Sheffield" and also the word "Quadruple" as defined in the above orders.

The order against I. Weisenfreind and B. Lieberman, trading as the Century Silver Manufacturing Company of New York City, requires the respondents to discontinue the wrongful use of the two words "Sheffield" and "Quadruple" and also the word "Dutch" or "Dutch Silver" in connection with the sale of silver plated ware which has not been made in Holland.

The commission found that in all the cases the practices ordered to be discontinued mislead and deceive the general buying public and are unfair to competing concerns who do not misbrand their products.—United States Daily, July 16, 1926.

CHROMIUM PLATING COMPANIES MERGE

A new company which will be known as the Chromium Corporation of America has been organized to take over the patents of the chromium plating process developed by the Chemical Treatment Company and the Chromium Products Corporation, the latter a subsidiary of the Metal & Thermit Corporation. This new company will have plants and branch offices in most of the leading industrial centers.

John T. Pratt, President of the Chemical Treatment Company will continue in that office and also be Chairman of the Board of the new Corporation of which Dr. F. H. Hirschland will be President. The latter is also President of the Metal & Thermit Corporation. Vice-Presidents in charge of operations will be Louis C. Owens, Jr., and Richard Loengard. Dr. Erich A. Beck is also a Vice-President. In addition to the above officers, the directors will consist of a prominent and financially strong group of business men.

In announcing the formation of the new corporation, Mr. Pratt said:

"The two companies whose chromium plating interests are now being taken over by the new Chromium Corporation of America have been the pioneers in the commercial development of this new art. In taking over the Fink and Grube patents, as well as others controlled by one or the other of the companies mentioned, the Chromium Corporation of America will own or control strong basic patents covering chromium plating under all conditions which are commercially feasible. It will also be allied with the rapidly developing German interests.

"Operating under the basic Grube process patent, the Metal & Thermit Corporation, and later its subsidiary, the Chromium Products Corporation, has maintained and operated an extensive and well-equipped chromium-plating plant in Jersey City in which it has been producing chromium plate in considerable volume for manufacturers of such products as plumbing fixtures, hardware, brake drums, reflectors, steel tubing, bearings of various types, electrical contact points, heat control devices, radiator shells and various automobile accessories. In addition it has concluded certain license agreements whereby manufacturers who will use chromium plating in large volume are enabled to apply it in their own plants.

"Working along similar, if not exactly parallel, lines the Chemical Treatment Company, operating under the process patents of Dr. Colin G. Fink, has built up a large business for a special type of chromium plating under its trade-name 'Crodon.'

"The new corporation will also take over, and operate, the Chromium Products plant in Jersey City and the Chemical Treatment plants in New York and Waterbury. Plans are also being formulated for the opening of new plants at Carteret, New Jersey; East Chicago, Indiana, and South San Francisco, in each of which the Metal & Thermit Corporation now has plants, as well as in Chicago, Detroit, Cincinnati, Akron, Philadelphia, Pittsburgh and

Cleveland. The company's expansion program contemplates a national service within two to three years.

"Having taken over from the Chemical Treatment Company its trade-name Crodon which will hereafter stand for chrome plate as applied by the Chromium Corporation of America or its licensees, the new company will inaugurate immediately an intensified selling, merchandising and engineering campaign which will cover manufacturers of certain types of metal products throughout the country. The Chemical Treatment Company policy of limiting the use of Crodon to manufacturers of quality products will be rigidly adhered to. At the same time, the educational advertising, designed to inform manufacturers, the trade and the public of the many advantages of Crodon will be intensified."

Directors are as follows: John T. Pratt, Dr. F. H. Hirschland, Hubert E. Rogers, Otis Glazebrook, Sr., Mr. Wheeler, W. T. Graham, Dr. Erich A. Beck, Louis C. Owens, Jr., Mr. Harding, Richard Loengard, T. Hart Anderson, Joseph D. Sears.

BALTIMORE BRASS OPERATES BENSON MILL

The Baltimore Brass Company, Baltimore, Md., is now operating the mill formerly operated by the Benson Rolling Mills in Glen Ridge, N. J., and will continue their line of products.

CHROMILITE PROCESS CORPORATION

Officials of the New Haven Sherardizing Company, 868 Winchester street, Hartford, Conn., manufacturer of special machinery for the rubber industry, and the Metal Protection Corporation, Indianapolis, have organized the Chromilite Process Corporation, capitalized at $150,000, to operate plants for rust-proofing, metal-finishing and chrome-nickeling of steel under a special process, developed by James F. Patton of the Indianapolis company, who will be vice-president of the new concern. The initial plant will be at Akron, Ohio, where property has been secured, and is expected to be ready for service in August. A second works is contemplated for Springfield, Mass. A third plant is expected to be established closely following at Hartford, Conn. August F. Schoen is president of the new company, and Wesley I. Charter of the New Haven Sherardizing Company, treasurer.

FOUNDRY SUPPLY HOUSES MERGE

The Paxson-Taggart, Inc. represents a consolidation of J. W. Paxson Company and M. R. Taggart & Company, who have combined their sand, supply and facing businesses. This consolidation took effect August 1, 1926.

General offices and plant are at Luzerne and D streets, Philadelphia. The management of Paxson-Taggart, Inc., will be in the same hands as was the management of the individual companies. The officers and directors will be: Albert Walton, President; Merrill R. Taggart, Vice-President and General Manager; Franklin B. Platt, Secretary; Gilbert P. Albrecht, Treasurer.

Foundry equipment will continue to be made and sold by J. W. Paxson Company, at Luzerne and D streets, whose entire efforts will be concentrated on equipment basis.

OAKITE PRODUCTS, INC.

The Oakley Chemical Company, New York, N. Y., manufacturers of Oakite products for industrial cleaning operations, announces a reorganization, with the new name of Oakite Products, Inc., a New York State corporation with $2,000,000 capital.

While the personnel of the management and the field organization of 70 cleaning specialists, located in 59 cities in this country and Canada, will remain the same, the new organization is planning to greatly enlarge the scope of its work.

Oakite Products, Inc., the new firm name of the company, will hereafter appear in all advertising in various technical and trade publications.

The general offices of Oakite Products, Inc., will continue to be at 22 Thames street, New York, N. Y., and the factory as heretofore at Bush Terminal, Brooklyn, N. Y.

BALBACH CONTROLS STOTTER METAL

After a year and a half of close co-operation between Balbach Smelting and Refining Company of Newark, N. J., and New York City, and Stotter Metal Company of Cleveland, Ohio, the Balbach Company has exercised the option which it acquired some months ago to purchase a controlling interest in Stotter Metal Company. The transaction has just been consummated and simultaneously James W. Paterson, Vice-President of Balbach Smelting and Refining Company, has become President of Stotter Metal Company. J. P. Stotter retires from the presidency and from the Board of Directors, Mr. Paterson succeeding Mr. Stotter on the Board.

R. L. Dummeldinger, of Cleveland, Ohio, has also retired from the Board of Stotter Metal Company, and Frank H. Andrus, formerly of Waterbury, Connecticut, has been elected a Director and Vice-President of the Company in the place of L. B. Stotter, resigned. Thomas Thomson remains as a Vice-President and James M. MacNee, Jr., continues as Secretary and Treasurer.

PIN COMPANIES MERGE

Official announcement was made at Winsted, Conn., July 7, 1926, that the consolidation of the Star Pin Company of Derby, Conn.; the New England Pin Company of Winsted and the National Pin Company of Detroit had been ratified. It is expected that the business of the New England Pin Company will be moved to Derby the latter part of the year. The business of the Detroit concern also will be taken to Derby.

The New England Pin Company employed 100 hands, many of whom had been with the company for half a century.—New York Times.

ANACONDA BUYS SILESIAN ZINC MINES

Purchase of the Silesian zinc mines of the George von Giesche's Heirs Mining Company by the Anaconda Company was announced by W. A. Harriman & Company and Lee Higginson & Co., heading a syndicate to finance the acquisition. The Silesian American Corporation has been formed to operate the mines.

Cornelius F. Kelly, president of Anaconda, will head the new Company together with $600,000 of the German company's sinking fund mortgage bonds. The Anaconda company will own a majority stock interest in the Silesian Holding Company, which will control the Silesian-American Corporation.

SAGUENAY ALUMINUM PLANT TO START

The Aluminum Company of America will start production at its new Saguenay River plant in Canada in September. Its ores will be obtained from the company's mines in South America. The advantage of duty-free shipments to the United Kingdom was a factor in the plant's location, but it is now expected that part of the output will be exported to the United States.—New York Times.

CRUCIBLE OUTPUT

A recent bulletin of the Bureau of Census indicates a decline of 33 per cent in manufactures of crucibles for 1925 as compared with 1923. This, however, includes glass house pots and other refractories produced at crucible plants. Deducting these items it is found that the Census figures show output of plumbago crucibles in 1925 amounting to $1,802,252 as compared with $2,312,739 for 1923 or a decline of 22 percent in value of output of crucibles alone.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	..	$68	$71
American Hardware Corporation	$100	81	83
Anaconda Copper	50	50¼	50½
Bristol Brass	25	..	..
International Nickel, com	25	38½	38¾
International Nickel, pfd	100	102	..
International Silver, com	100	90	92
International Silver, Pfd	100	100	105
National Enameling & Stamping	100	23	23½
National Enameling & Stamping, pfd	..	75	80
National Lead Company, com	100	157	160
National Lead Company, pfd	100	116½	118
New Jersey Zinc	100	191	195
Rome Brass & Copper	100	122	135
Scovill Manufacturing Company	..	230	240
Yale & Towne Mfg. Company, new	..	67	67¼

Corrected by J. K. Rice, Jr., Co., 120 Broadway, New York.

COPPER EXPORT ASSOCIATION

Formation of a new organization of copper producers throughout the world, including the Anaconda Copper Mining Company and its subsidiaries, with the view of stabilizing the price of the metal in world markets is reported to be under way and formal announcement is expected as soon as all legal formalities can be completed.

All of the principal copper producing companies in America, with the exception of the Miami Copper Company, are understood to be ready to enter the new corporation, as are virtually all of the European concerns. Approximately 90 per cent of the world's copper production is represented in the new combination, which will be completed when necessary contracts, which must go to European cities, are returned to New York, where the corporation is being formed.

The Wall Street Journal in commenting on the organization states that it is understood that each of the companies will retain its own selling agency abroad, but each member of the organization will have a right to participate in the various sales provided it so elects. This will tie the various producers together, but will give them a certain amount of freedom of action. It is hoped that the new organization will be able to stabilize copper prices and thus avoid the wide fluctuations which have occurred in the past. The Journal states that stabilization of prices is as much to the advantage of the consumer in the long run, as it is to the producer.

INTERNATIONAL NICKEL EARNINGS

Second quarterly earnings of the International Nickel Company aggregated $1,408,116 after taxes, depreciation, depletion, etc., which are equal after preferred dividends to 76 cents a share on 1,673,384 shares of common stock. This compares with $1,294,117, or 69 cents a share in the June quarter of last year. For the first six months of this year net profit was $2,774,689, equal to $1.49 a share on the common after preferred dividends, as against $2,584,200, or $1.38 a share in the corresponding half of last year.

Review of the Wrought Metal Business

Written by the Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

AUGUST 2, 1926.

The steadily increasing demand for metals has now reached a point where it has become necessary for some of the mills to extend their manufacturing facilities. It is reported that one of the sheet copper mills is building an addition which will increase its output 50 to 75%. The manufacturers of Monel metal have begun an installation at their plant in Huntington, W. Va., which will double the capacity of their sheet mill. The era of the non-ferrous metal seems to be at hand, and the increase in consumption of these metals is going forward by leaps and bounds.

It has been noted that the building industry for the past few years has, at least in the Atlantic States, adopted sheet copper as standard trim for houses, and the consumption of sheet copper in this line has been at a tremendous rate. It appears now that the same sort of a development is going forward in the consumption of brass pipe, as practically all buildings, even those which are of speculative character which are now being erected have more or less brass pipe throughout their plumbing work. Some are equipped entirely with this pipe. Some recent contracts for large quantities of brass pipe have been placed for the West Virginia State capitol at Charleston, W. Va., and two of the prominent buildings at the Sesqui-Centennial Exposition in Philadelphia are completely equipped with brass pipe in their plumbing.

It is reported by many speculative builders that the public are now so educated to the value of non-corrosive metals in building construction that people looking at property for sale inquire for and demand that the sheet metal work be of copper and the plumbing of brass. Probably the largest job in the Metropolitan District recently is the Hotel Manger at 7th Avenue and 51st Street, New York City, which is equipped throughout the building with brass pipe and brass trim for both the hot and cold water systems.

As indicated above the demand for nickel-copper alloys, especially Monel metal, continues to increase and the mills producing this material are running twenty-four hours a day in an effort to keep up with the orders. Manufacturers of ice cream cabinets, soda fountains, laundry machinery and textile machinery are all running full, and from these industries the demand for white metals, generally, and Monel metal in particular has been very heavy.

It is difficult to see any signs of any depression or falling off in the demand, and at this time, it appears as if the second half of the year will be at least as prosperous as the first half, if not more so. As a result of the generally optimistic feeling that prevails consumers have extended their buying and are contracting for their requirements in advance to such an extent that the forward bookings of the mills have increased very materially and a large part of the production for the next three or four months has already been sold.

Metal Market Review

Written for The Metal Industry by R. J. HOUSTON, of D. Houston & Company, Inc., Metal Brokers, New York.

COPPER

AUGUST 2, 1926.

The situation in this metal, both statistically and industrially, is decidedly sounder than a month ago. Output of refined copper in June was 233,486,000 pounds, but domestic shipments and exports for that month were 240,032,000 pounds. Total shipments to domestic and foreign buyers for the first half of 1926 amounted to 1,400,478,000 pounds. United States production of refined copper for same period amounted to 1,386,506,000 pounds. Deliveries are greater than output, and surplus stocks are smaller by 40,000,000 pounds than on March 1, 1926. There seems to be a sound basis therefore for the high expectation that the market is in good position to properly reflect the tremendous size of the yearly demand for copper. The tone is strong, with holders asking 14½c for electrolytic. This price compares with 13⅞c on July 1.

ZINC

There has been a fair increase in volume of business, and prices have improved in the domestic and foreign markets compared with a month ago. Zinc ore advanced to $50 and some business was reported at as high as $52. The strong tone of the ore situation has served to steady prices for slab zinc. Consumption in Germany shows improvement, and the Continental position is in better shape than it was. There was heavy domestic buying in the first half of July, and this was quickly followed by increased market strength. American production in June was the smallest in 9 months and deliveries the largest in 8 months, with one exception in March when deliveries were 54,191 tons. Market quotes 7.80c New York and 7.45 St. Louis for Prime Western grades.

TIN

The statistical position of tin has attracted much attention for many months past showing as it does heavy deliveries and decreasing supplies. The total world's visible supply on July 1 was estimated at 15,831 tons, against 19,797 tons on July 1, 1925, a decrease of 3,966 tons. American tin deliveries for first half of 1926 amounted to 40,115 tons compared with 37,255 tons for the last half of 1925. The consuming power of this country has increased to a pronounced extent during the last 18 months. A further substantial expansion in demand in the last half of 1926 is not improbable and would prove a fresh argument for market strength. Price fluctuations may be expected, but until supplies begin to show an increase market movements are likely to be erratic and impressive. American deliveries during July amounted to 7,630 tons. These are the largest deliveries since February, 1924, when they amounted to 8,845 tons. Total American deliveries for the first seven months of this year were 47,745 tons as compared with 45,675 tons for the corresponding period last year.

LEAD

There was a well sustained demand for lead recently, and the market was in excellent shape to score an important improvement. Domestic consumption is maintained on a heavy scale. Producers are represented as in well sold position, and offerings were readily disposed of. The American Bureau of Metal Statistics reports production of lead in North America in June declined approximately 2,000 tons, but this was more than offset by gains in output by Australia, Italy, Spain and Tunis. The leading American producer advanced prices four different times in the month of July. The New York basis was raised from 8.40c on July 13 to 8.90c on July 30. Price in the middle west quote as high as 9c St. Louis basis.

ALUMINUM

The steady large scale consumption of aluminum continues. The prospect is also good for heavy requirements during the balance of the year. Importations of aluminum for the first five months of this year amounted to 33,830,969 pounds against but 9,558,013 pounds for the first five months of last year. Total imports for the entire year of 1925 were 43,409,546 pounds. The leading producer has made new classifications of their product, but undoubtedly the consumer will continue to get the grade he finds best suited to his requirements. Quotations remain at 27c@28c for 99% plus and 27c for 98-99%. Metallurgical 94-99% is quoted at 26c. Supplies appear to be ample for current demand.

ANTIMONY

Prices of antimony were again advanced in July owing to the unsettled situation in China. There was considerable activity in the market recently and 15.50c duty paid was reported for August arrival. There were also buyers at 13.25c c. i. f. New York for July-August shipment from China. Floods and civil warfare have interferred with the normal production and shipment of supplies. Sellers have resorted to "force majeure" conditions in their contracts as a measure of protection against delay in arrivals. The market is more or less unsettled owing to the difficulties of securing regular and definite shipments from Chinese sources. Recent advices from the Orient are strong, but conditions are liable to change from day to day according to the nature of developments. Chinese regulus for prompt delivery quotes 15½c@15⅝c duty paid.

QUICKSILVER

Demand is not specially active and prices are easier at $90 to $90.50 per flask. Increased inquiries are expected in the next few weeks.

PLATINUM

Refined platinum is quoting $111 per ounce. Recent improvement was noted in demand. Imports of platinum ingots into this country in April amounted to 5,368 ounces. Total imports for the first ten months of the fiscal year were 21,718 ounces.

SILVER

Silver prices have displayed an easier tone lately due to rather passive attitude of China and India. Far East inquiries were not important enough to give the market strong support. The indications were that the Chinese had overbought and were not disposed to resume heavy buying at present. Present official quotation is 63⅞c as against 65⅝c on July 1.

OLD METALS

The scrap metals have closely followed the markets for new metals. Improvement in prices resulted in a somewhat better demand for the copper and lead grades. Both sellers and buyers are conservative in their commitments, but dealers lean to the idea that copper and lead are in a strong position. Frequent spurts and subsequent relapses on former occasions have fostered a cautious attitude, however, and this is natural until the situation demonstrates actual strength. Closing quotations at New York are 11⅞c for heavy copper, 12¼c for crucible copper, 9¾c@10c for light copper, 7½c for heavy brass, 6½c for light brass, 7¾c@8c for heavy lead, 4c@4¼c for old zinc, and 21c@21½c for aluminum clippings.

WATERBURY AVERAGE

Lake Copper—Average for 1925, 14.427—January, 1926, 14.25c.—February, 14⅜c.—March, 14.25c.—April, 14.125c.—May, 14.00c.—June, 14.00c.—July, 14.25c.

Brass Mill Zinc—Average for 1925, 8.263—January, 1926, 9.00c.—February, 8.20c.—March, 7.80c.—April, 7.45c.—May, 7.20c.—June, 7.55c.—July, 7.80c.

Daily Metal Prices for the Month of July, 1926

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	2	5*	6	7	8	9	12	13	14	15	16	19
Copper (f. o. b. Ref.) c/lb. Duty Free													
Lake (Delivered)	14.00	14.00	.....	14.00	14.00	14.125	14.125	14.125	14.25	14.25	14.25	14.25	14.25
Electrolytic	13.75	13.75	.....	13.85	13.85	13.90	13.925	14.00	14.00	14.05	14.05	14.05	14.00
Casting	13.40	13.40	.....	13.45	13.45	13.45	13.50	13.55	13.55	13.65	13.65	13.65	13.625
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	7.20	7.20	.....	7.25	7.25	7.275	7.35	7.50	7.55	7.575	7.525	7.50	7.50
Brass Special	7.275	7.275	.....	7.325	7.325	7.35	7.40	7.575	7.575	7.65	7.60	7.575	7.575
Tin (f. o. b., N. Y.) c/lb. Duty Free													
Straits	61.70	61.75	.....	62.375	62.00	62.375	62.375	62.25	62.75	63.25	63.25	63.25	63.50
Pig 99%	59.375	59.375	.....	60.125	60.00	60.25	60.25	60.25	60.875	61.125	61.00	61.00	61.25
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb.	8.10	8.10	.....	8.10	8.10	8.125	8.20	8.25	8.40	8.60	8.55	8.50	8.50
Aluminum c/lb. Duty 5c/lb.	28	28	.....	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.													
Ingot	35	35	.....	35	35	35	35	35	35	35	35	35	35
Shot	36	36	.....	36	36	36	36	36	36	36	36	36	36
Electrolytic	39	39	.....	39	39	39	39	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	13.50	13.50	.....	13.75	13.50	13.75	13.75	14.00	14.00	13.75	13.75	14.00	14.25
Silver c/oz. Troy Duty Free	65.625	65.75	.....	65.375	65.25	65.625	65.50	65.125	65.25	65.50	65.125	64.875	64.625
Platinum $/oz. Troy Duty Free	110	110	.....	110	110	110	110	111	111	111	111	111	111

	20	21	22	23	26	27	28	29	30	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	14.25	14.375	14.375	14.375	14.375	14.375	14.375	14.375	14.50	14.50	14.00	14.238
Electrolytic	14.00	14.05	14.05	14.05	14.10	14.10	14.15	14.20	14.25	14.25	13.75	14.006
Casting	13.625	13.65	13.65	13.65	13.75	13.75	13.75	13.90	13.90	13.90	13.40	13.617
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	7.50	7.45	7.50	7.50	7.50	7.475	7.475	7.475	7.45	7.575	7.20	7.429
Brass Special	7.575	7.55	7.60	7.60	7.60	7.55	7.55	7.55	7.50	7.65	7.275	7.504
Tin (f. o. b., N. Y.) c/lb. Duty Free												
Straits	63.75	63.50	63.50	63.25	64	63.75	63.625	64.25	64.125	64.25	61.70	63.075
Pig 99%	62.00	61.95	62.125	61.50	62.75	62.625	62.75	63.50	63.375	63.50	59.375	61.307
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb.	8.50	8.50	8.50	8.65	8.75	8.75	8.85	8.85	9.00	9.00	8.10	8.470
Aluminum c/lb. Duty 5c/lb.	28	28	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	39	39	39	39	39	39	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	14.25	15.00	15.25	15.75	16.00	16.00	15.625	15.625	15.625	16.00	13.50	14.506
Silver c/oz. Troy Duty Free	64.25	64.25	64.50	64.50	63.875	63.875	64.25	64.125	63.875	65.75	63.875	64.863
Platinum $/oz. Troy Duty Free	111	111	111	111	111	111	111	111	111	111	110	110.714

* Holiday.

Metal Prices, August 9, 1926

NEW METALS

Copper: Lake, 14.50. Electrolytic, 14.25. Casting, 13.90.
Zinc: Prime Western, 7.35. Brass Special, 7.425.
Tin: Straits, 65.625. Pig, 99%, 64.625.
Lead: 8.85 **Aluminum,** 28.00. **Antimony,** 16.25.
Nickel: Ingot, 35. Shot, 36. Elec., 39. Pellets, 40.
Quicksilver: flask, 75 lbs., $92.50. **Bismuth,** $2.70 to $2.75.
Cadmium, 60. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 61.625.
Gold, oz., Troy, $20.67. **Platinum,** oz., Troy, $112.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10¼ to 11
Brass Ingots, Red	11¼ to 12¾
Bronze Ingots	11¾ to 12¾
Casting Aluminum Alloys	21 to 24
Manganese Bronze Castings	23 to 41
Manganese Bronze Ingots	13 to 17
Manganese Bronze Forging	34 to 42
Manganese Copper, 30%	25 to 35
Monel Metal Shot	32
Monel Metal Blocks	32
Parsons Manganese Bronze Ingots	18¼ to 19¾
Phosphor Bronze	13½ to 15
Phosphor Copper, guaranteed 15%	18⅞ to 22½
Phosphor Copper, guaranteed 10%	18 to 21½
Phosphor Tin, guaranteed 5%	70 to 80
Phosphor Tin, no guarantee	67 to 77
Silicon Copper, 10% ....according to quantity...	25 to 35

OLD METALS

Buying Prices		Selling Prices
11¾ to 12¼	Heavy Cut Copper	13¼ to 13¾
11½ to 12	Copper Wire	13 to 13¼
10¼ to 10¾	Light Copper	11½ to 11¾
9¼ to 9½	Heavy Machine Composition	10¾ to 11
7¾ to 8	Heavy Brass	9 to 9¼
6¾ to 7	Light Brass	8 to 8¼
7¾ to 8¼	No. 1 Yellow Brass Turnings	9¼ to 10
8¾ to 9¼	No. 1 Composition Turnings	10½ to 11
7½ to 7¾	Heavy Lead	8¼ to 8½
5 to 5¼	Zinc Scrap	6 to 6½
12 to 13	Scrap Aluminum Turnings	15 to 17
16½ to 18	Scrap Aluminum, cast alloyed	20 to 21
22½ to 23	Scrap Aluminum, sheet (new)	24 to 25½
38 to 40	No. 1 Pewter	42 to 44
12	Old Nickel Anodes	14
18	Old Nickel	20

Wrought Metals and Alloys

COPPER SHEET

Mill shipments (hot rolled) ..... 22c. to 23c. net base
From stock ..... 23c. to 24c. net base

BARE COPPER WIRE

16¾c. to 16⅞c. net base, in carload lots.

COPPER SEAMLESS TUBING

25c. to 26c. net base.

SOLDERING COPPERS

300 lbs. and over in one order ..... 21½c. net base
100 lbs. to 200 lbs. in one order ..... 22 c. net base

ZINC SHEET

Duty, sheet, 15% — Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount ..... 11.75 net base
Casks, jobbers' price ..... 13.00 net base
Open Casks, jobbers' price ..... 13.50 to 13.75 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price ..... 40c.
Aluminum coils, 24 ga., base price ..... 36.70c.
Foreign ..... 40c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods ..... 58c. Cold Rolled Sheet ..... 60c.
Hot Rolled Rods ..... 50c. Hot Rolled Sheet ..... 52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c or over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver, 64¾ to 66¾c.

BRASS MATERIAL—MILL SHIPMENTS

In effect August 3, 1926
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.19⅜	$0.20⅞	$0.22⅞
Wire	.19⅞	.21⅜	.23⅜
Rod	.17⅛	.21⅝	.23⅝
Brazed tubing	.27⅜	.....	.32⅝
Open seam tubing	.27⅜	.....	.32⅝
Angles and channels	.30⅜	.....	.35⅝

For less than 5,000 lbs. add 1c. per lb. to above prices.

BRASS SEAMLESS TUBING

24¼c. to 25¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod ..... 21¾c. net base
Muntz or Yellow Metal Sheathing (14"x48") 19¾c. net base
Muntz or Yellow Rectangular sheet other Sheathing ..... 20¾c. net base
Muntz or Yellow Metal Rod ..... 17¾c. net base
Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal			Wire and Rod		
10%	Quality	27¼c.	10%	Quality	30¼c.
15%	"	28¾c.	15%	"	34 c.
18%	"	30 c.	18%	"	37¼c.

MONEL METAL SHEET AND ROD

Hot Rolled Rods (base) 35 Hot Rolled Sheets (base) 42
Cold Drawn Rods (base) 43 Cold Rolled Sheets (base) 50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

Supply Prices, August 9, 1926

ANODES

Copper: Cast ..... 21¾c. per lb.
Rolled ..... 21⅜c. per lb.
Electrolytic ..... 18⅞c. per lb.
Brass: Cast ..... 20¾c. per lb.
Rolled ..... 21⅜c. per lb.
Zinc: Cast ..... 14c. per lb.

Nickel: 90-92% ..... 45c. per lb.
95-97% ..... 47c. per lb.
99% ..... 49c. per lb.
Silver: Rolled silver anodes .999 fine are quoted from 67¼c. to 69¼c. per Troy ounce, depending upon quantity purchased.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$31.00-32.40
14" 20 ply 64/68 Unbleached	38.55-40.30
12" 20 ply 80/92 Unbleached	33.05
14" 20 ply 80/92 Unbleached	44.80
12" 20 ply 84/92 Unbleached	37.75-42.85
14" 20 ply 84/92 Unbleached	51.20-57.60
12" 20 ply 80/84 Unbleached	37.75-38.90
14" 20 ply 80/84 Unbleached	51.20-52.40

Sewed Pieced Buffs, per lb., bleached 65-75c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12-.16
Acid—Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.17½-.22
Denatured	gal.	.40
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.042
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—Sulphate, tech. bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.30
Copper—Acetate (Verdegris)	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls.	lb.	.05¼
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron, Sulphate (Copperas), bbl	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13½
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.21
Nickel—Carbonate dry, bbls	lb.	.29
Chloride, bbls.	lb.	.18
Salts, single 300 lb. bbls	lb.	.10½
Salts, double 425 lb. bbls	lb.	.10
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity		.35-.40
Potash, Caustic Electrolytic 88-92% fused drums	lb.	.09¼
Potassium Bichromate, casks (crystals)	lb.	.08½
Carbonate, 96-98%	lb.	.07
Cyanide, 165 lb. cases, 94-96%	lb.	.52½-.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.66
Nitrate, 100 ounce lots	oz.	.45¾
Soda Ash, 58%, bbls	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs	lb.	.20
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03¾
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.43½
Tripoli, Powdered	lb.	.03
Wax—Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls	lb.	.11-.12
Chloride, casks	lb.	.07⅜
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03⅜